

PMOC REPORT

OP 51 – Readiness to Enter Final Design

**Honolulu High Capacity Transit Corridor Project
City and County of Honolulu
Honolulu, Hawaii**

December 2011 (REVISED FINAL)

PMOC Contract Number: DTFT60-09-D-00012

Task Order Number 2: Honolulu

Work Order Number 3

Project No. DC-27-5140

OPs Referenced: OP 1, OP 51

Jacobs Engineering Group, Inc., 501 North Broadway, St. Louis, MO 63102

Tim Mantych, P.E., (314) 335-4454, tim.mantych@jacobs.com

Length of Time Assigned: Five Years (November 18, 2009 through November 17, 2014)

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1.0 EXECUTIVE SUMMARY

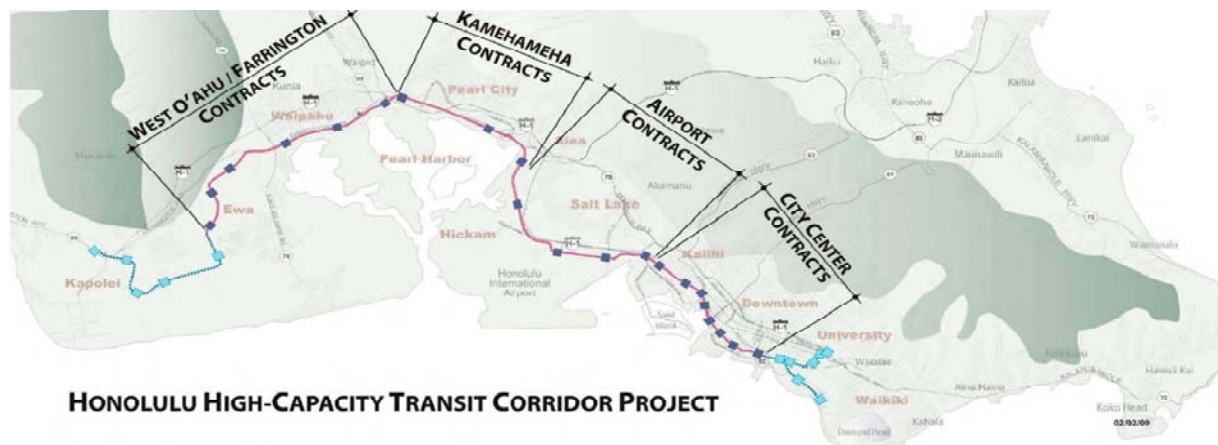
1.1 Introduction

The City and County of Honolulu (“grantee”) is requesting that the Honolulu High-Capacity Transit Corridor (HHCTC) Project (“Project”) be permitted to enter into Final Design, in accordance with the Federal Transit Administration (FTA) New Starts requirements. The Project is intended to provide improved mobility in the highly-congested east-west corridor along Oahu’s south shore. The Project would provide faster, more reliable public transportation services than those currently operating in mixed-flow traffic.

The Project is an approximately-20-mile-long elevated fixed guideway driverless rail system along Oahu’s south shore between East Kapolei and Ala Moana Center. The alignment is elevated, except for a 0.6-mile at-grade portion at the Leeward Community College station. The proposed investment includes 21 stations (20 aerial and 1 at-grade), 80 “light metro” rail transit vehicles, administrative/operations facilities, surface and structural parking, and a rail vehicle maintenance and storage facility. The grantee plans to deliver the Project in four guideway segments, as shown in Figure 1:

- Segment I (West Oahu/Farrington Highway) – East Kapolei to Pearl Highlands (6 miles/7 stations)
- Segment II (Kamehameha Highway) – Pearl Highlands to Aloha Stadium (4 miles/2 stations)
- Segment III (Airport) – Aloha Stadium to Middle Street (5 miles/4 stations)
- Segment IV (City Center) – Middle Street to Ala Moana Center (4 miles/8 stations)

Figure 1. Project Map Showing Line Segments



In addition, the project includes contracts for:

- Core Systems
 - Vehicles
 - Signals and communications
 - OCC
 - Traction Power
- Security
- Ticket vending
- Operations
- Maintenance and Storage Facility
 - Administration Building

- Maintenance of Way Facility
- Shops
- Layover facility
- Stations
- 21 stations
- Pearl Highlands Garage, Ramps design and construction contract
- Elevators and Escalators

The grantee is utilizing traditional (Design/Bid/Build or DBB) and alternative (Design/Build, or DB, and Design/Build/Operate/ Maintain, or DBOM) project delivery methods for the various contracts. The West Oahu-Farrington Highway (WOFH) Segment DB Contract, Kamehameha Highway Segment DB Contract, the MSF DB Contract, and the Core Systems DBOM Contractor have all been awarded by the time of this report. The former three are all DB Contracts, while the latter, the Core Systems Contract, is a DBOM type contract, wherein the contractor will be responsible for designing and building the vehicles and the systems-related project elements while also being responsible for operations and maintenance of the same for a specified period after the Revenue Service Date (RSD). Only the two eastern line sections (Airport and City Center) and the stations have not yet been bid, as these are the contracts to be designed and built using the traditional DBB method.

The grantee intends to begin revenue service incrementally:

- First incremental opening includes West Oahu/ Farrington Highway and Kamehameha Highway Segments and is scheduled for late 2015
- Second incremental opening includes the Airport Segment and is scheduled for late 2017
- Full revenue services will include the City Center Segment and is scheduled for 2019

Additional Project information:

- **Vehicles:** 80 “Light Metro” rail vehicles (identified as Heavy Rail in SCC workbook), supplied by the Core Systems Contractor (CSC), which is also responsible for systems design and construction and operations.
- **Ridership Forecast:** Weekday boardings – 97,500 (2019); 116,300 (2030).
- **Base Cost Estimate (BCE):** \$5.126 billion in Year-of-Expenditure (YOE) dollars, including \$797.69 in total contingency (or 19.5%) and \$246.98 million in financing costs
- **Grantee Target Start of Revenue Operations for Full Alignment:** June 2019 (per MPS with Data Date of September 30, 2011)
- **Recommended FFGA Revenue Service Date (RSD):** January 2020

1.2 PMOC Review

This report represents the PMOC’s assessment of the Project’s readiness to enter Final Design. The report provides analysis and conclusions as requested by FTA’s “*Oversight Procedure (OP) 51 – Readiness to Enter Final Design.*” This effort is supported by reports on specific aspects of the project that the PMOC prepared in advance of the grantee’s request to enter Final Design:

- OP 20 – PMP Review
- OP 21 – Technical Capacity and Capability Review
- OP 22 – SSMP Review
- OP 23 – RAMP Review
- OP 24 – QA/QC Review
- OP 27 – Before and After Study Reviews

- OP 32A – Project Transit Capacity Review
- OP 32C – Project Scope Review
- OP 32D – Project Delivery Method Review
- OP 33 – Capital Cost Estimate Review
- OP 34 – Project Schedule Review
- OP 37 – Fleet Management Plan Review (Bus)
- OP 37 – Fleet Management Plan Review (Rail)
- OP 38 – Bus and Rail Vehicle Technical Review
- OP 40 – Risk and Contingency Review

Appendix C of this report provides a summary of the requirements identified in the Preliminary Engineering approval letter issued by the FTA on October 16, 2009, as well as their current status.

1.3 Findings

1.3.1 Scope

The scope, as contained in the Project’s Final Environmental Impact Statement (FEIS) and Record of Decision (ROD), is reflected in the Preliminary Engineering (PE) plans, specifications, estimates, and the Project Management Plan (PMP).

Through PE plans and performance specifications, the grantee has provided enough project information to fully illustrate the scope, capacity, level of service, functionality, and expected reliability of the completed project. The documents provided sufficiently characterize elements of the project and exceed the requirements of a PE design.

The project scope review noted numerous challenges to the Project, including implementing the CSC as soon as possible, managing coordination issues between the grantee and its many contractors, controlling costs, making key decisions (e.g., resolving the Ala Moana Station layout and implementing accepted VE alternatives), implementing third-party agreements, and resolving the WOFH contract precast yard issue. All of these issues can (and must) be resolved during Final Design. *Note: HART executed the Core Systems Contract (CSC) with Ansaldo Honolulu Joint Venture (AHJV) on November 28, 2011.*

It is the PMOC’s professional opinion that the current scope is sufficiently defined and that it meets the FTA guidance and requirements necessary to advance the Project into the Final Design phase.

1.3.2 Schedule

The Schedule Review categories systematically characterized each element in the project/program schedule, from schedule development and performance measurement through post-project archive record documentation. The Schedule Review evaluated the efficiency and effectiveness of the grantee’s project implementation during any phase of the project life cycle.

The Schedule Review validated the inclusivity of the Project scope and the characterization of individual project elements within the current Project phase. It also validated the program management's readiness to enter and implement the next major program phase, the Final Design phase.

The PMOC has identified a significant number of recommendations and opportunities to strengthen the integrity of the grantee's Project Controls organization, procedures, plans, technical schedule input, and technical capacity and capability. The PMOC expects the grantee to incorporate these recommendations during the Final Design phase and prior to submission of refreshed cost estimate and schedule documents in support of a Full Funding Grant Agreement (FFGA) Application.

The grantee submitted a Master Project Schedule on September 30, 2011 that identified a target start of full revenue operations of June 2019. However, based on an assessment of the schedule, the PMOC recommends the FFGA Revenue Service Date (RSD) should be no earlier than January 2020.

It is the PMOC's professional opinion that the current Master Project Schedule is mechanically correct and fundamentally sound, and that it meets the FTA guidance and requirements necessary to advance the Project into the Final Design phase.

1.3.3 Cost Estimate

The grantee's submitted an initial Base Cost Estimate (BCE) dated March 25, 2011. The initial estimate, referred to as the *2011 Standard Cost Category (SCC) Estimate* within this report, was \$5.213 billion in Year-of-Expenditure (YOE) dollars, including \$865.58 million in allocated and unallocated contingency and \$230 million in financing costs. However, in September 2011, the grantee proposed eight Cost Reduction Measures that resulted in the current Base Cost Estimate of \$5.126 billion in Year-of-Expenditure (YOE) dollars, including \$797.69 in total contingency (or 19.5%) and \$246.98 million in financing costs.

The PMOC evaluated the initial cost estimate for each Standard Cost Category (SCC) for mechanical soundness and consistency. These mechanical checks were used to determine if there were any material inaccuracies within the estimate. The *2011 SCC Estimate* was found to be mechanically correct in the tabulation of the unit cost, application of factors, and translation to the "Build Main" tab of the SCC workbook.

The PMOC randomly sampled cost estimate line items to determine if the cost estimate backup cross-walked into the SCC workbook. In each instance, the PMOC found that the calculated values translated to the SCC workbook and back to the cost estimate backup without variance or mechanical issues. The PMOC identified 22 suggested adjustments to the cost estimate. These adjustments were used to develop an Adjusted Base Cost Estimate. The input for the Cost Risk Model and basis for the evaluation of project cost contingency is the Adjusted BCE, which was the BCE net of contingencies and finance costs and includes the PMOC adjustments.

It is the PMOC's professional opinion that the current cost estimate is mechanically and fundamentally sound and reasonable and that it meets the FTA guidance and requirements necessary to advance the Project into the Final Design phase.

1.3.4 Cost Reduction Measures

As noted above, the grantee identified several capital cost reduction measures as part of the base case capital cost estimate assumed in the September 2011 revised draft financial plan. These Cost Reduction Measures were proposed to address lower net General Excise Tax (GET) surcharge revenues. In addition, the grantee identified certain cost elements as having the potential to be deferred and paid for on a pay-as-you-go basis without adversely affecting the overall project schedule. The net change of \$87 million is calculated as the difference between the Capital Cost Reductions (\$104 million deduction) and Financing Cost Changes (\$17 million addition).

The PMOC has reviewed the grantee's eight (8) proposed Cost Reduction Measures. In general, the PMOC agrees with the premise of each Cost Reduction Measure. However, the PMOC also notes that the scope detail to support many of the Cost Reduction Measures is minimal, at best. The grantee must ensure that detailed design is completed early in Final Design to support both the scope changes and the associated cost estimates.

The grantee must modify the Project Schedule to reflect the changes, which, while likely to reduce construction time, may have an adverse effect on design time. It is also imperative that the grantee assure that other aspects of the project are not degraded as a result of implementing these Cost Reduction Measures, such as Safety and Security, capacity, operations, maintainability, and service to the community.

1.3.5 Project Risk and Contingency Review

The PMOC performed *“an evaluation of the reliability of the grantee's project scope, cost estimate, and schedule, with special focus on the elements of uncertainty associated with the effectiveness and efficiency of the grantee's project implementation and within the context of the surrounding project conditions.”* Through the process of risk and contingency review, the PMOC attempts to aid the grantee in its efforts to better define the project's risks and to provide avenues for recovery should those risks become reality.

The PMOC has provided recommendations for adjustments to scope, cost, and project delivery options and risk mitigation options and alternatives, particularly concerning contingencies, in order to respond to established project risks.

OP 51 guidance requests a *“characterization of significant uncertainties.”* While the risk register, risk workshops, and OP 40 review all dealt with the likelihood and consequences of numerous risk events, the Risk Management exercise and the recommendation for contingency and mitigation strategies are designed to plan for these uncertainties. The following table lists the Project's significant uncertainties as identified in the Risk Register:

Table 1. Significant Uncertainties Identified in Risk Register

Uncertainty	Likelihood	Consequence
Risk #16 – All agreements with utility owners are not in place.	Remote	Critical
Risk #31 – Additional environmental documents may be required	Remote	Critical
Risk #36 – Unanticipated litigation may add cost to the Project (e.g., protests from adversary groups, community groups, adjacent landowners, and other affected parties)	Probable	Critical
Risk #51 - Insurance costs may be transferred to Contractor and result in change orders leading to additional costs	Probable	Moderate
Risk #56 – HDOT/BWS may not grant waiver to leave in place abandoned water pipes resulting in potentially costly removal and schedule disruption	Remote	Moderate
Risk #57 – Discovery of iwi (most importantly and critically in the City Center section)	Probable	Moderate
Risk #59 – Traffic disruptions may result in revised constraints imposed by City or HDOT (lane restrictions and peak time flow restrictions)	Remote	Moderate
Risk #60 – Geotechnical subsurface conditions worse than expected	Probable	Moderate
Risk #67 – Delay to issue WOFH NTP results in claims for additional costs	Probable	Critical
Risk #116 – Water mains may not be permitted to be relocated around columns and may instead require significant diversion / relocation	Remote	Moderate

The grantee has submitted a final baseline Risk and Contingency Management Plan (RCMP) dated September 22, 2011. The PMOC has made the following observations from a review of the RCMP:

- (1) Primary risk mitigations proposed by the grantee are sufficiently identified.
- (2) An organization structure to manage the risk process has been identified but may require refinement as implementation of the RCMP occurs.
- (3) Grantee has identified \$267 million in Secondary Mitigation options. The PMOC recommendation was \$594 million. The grantee must reevaluate its Secondary Mitigation Measures to ensure that Secondary Mitigation Capacity is not reduced with the adoption of the proposed Cost Reduction Measures.
- (4) Grantee has adjusted its allocated and unallocated contingency to reflect the PMOC adjustments and recommendations.

The PMOC has determined that the grantee has satisfied the guidelines and requirements specific to risk management.

1.3.6 Project Management Plan (PMP) Review

The grantee submitted Revision 4 of the Project Management Plan (PMP), dated April 2011. While the PMOC has identified PMP revisions that will be necessary prior to the FFGA, it has nevertheless found the PMP to be a generally well-written and thorough document that satisfies the FTA requirements for a project entering the Final Design phase. The grantee has also prepared numerous sub-plan documents, which are referenced in the PMP and provide additional detail and information. These plans have all been reviewed in accordance with the applicable OPs and have been found to be acceptable.

The PMOC recommends that PMP Revision 4, dated April 2011, be approved as a deliverable for entering Final Design.

1.3.7 Technical Capacity and Capability (TCC) Review

The PMOC has assessed the grantee's Technical Capacity and Capability to successfully implement, manage, and complete a major Federal-assisted capital project as well as its ability to recognize and manage project risk factors and implement mitigation measures. In doing so, the PMOC has identified a significant number of issues that the grantee should address during Final Design, such as filling staffing needs, clarifying the QA/QC process and document control procedures, addressing real estate and relocation needs, and modifying management deliverables and implementing necessary changes to reflect the institution of HART as a Project-controlling agency.

It is the PMOC's professional opinion that the grantee has demonstrated its Technical Capacity and Capability to effectively and efficiently proceed into the Final Design phase.

1.4 Conclusion

The PMOC has determined that the grantee has demonstrated the Technical Capacity and Capability to effectively and efficiently proceed into the Final Design phase, once all deliverables are submitted and accepted as mentioned above. The PMOC has also identified several Technical Capacity and Capability issues that must be addressed during Final Design, a condition which is inherent with a mega-program and blended organization. These challenges will continue and will require close attention by the grantee and close monitoring by the PMOC during the Final Design phase.

The PMOC recommends that the FTA provide approval for the City and County of Honolulu to proceed with Final Design for the Honolulu High-Capacity Corridor Project. The Project budget should be \$5.126 billion in YOE, including \$797.69 in total contingency (or 19.5%) and \$246.98 million in financing costs. The FFGA Revenue Service Date should be no earlier than January 2020.

It should be noted that the recommended budget is based on the limited data regarding the Cost Reduction Measures that were provided by the grantee. These cost reduction measure values must be validated after more detailed supporting documentation is developed early in Final Design.

1.5 Recommendations

The following table provides a summary of all PMOC recommendations and the timing for their implementation (Prior to Final Design or During Final Design).

Table 2. PMOC Recommendations

No.	PMOC Recommendation	Prior to Final Design	During Final Design
Project Scope Review			
A-1	Once the CSC is given an NTP, the grantee must work with that contractor to resolve capacity issues (see OP 32A deliverable for details) and implement project controls to coordinate CSC work with that of other contractors.		✓
A-2	The grantee needs to expand its review and project management staff as planned per its Project Management Plan (PMP) in order to maintain control of the various concurrent projects.		✓
A-3	The grantee must manage the schedule and budget by implementing controls as described in its project management plans early in Final Design. This is particularly true for those DB projects already awarded, as Final Design overlaps with early construction.		✓
A-4	The grantee should resolve its Ala Moana Station design, whether by incorporating suggestions made by the Stations Value Engineering (VE) team or by other means, perhaps with the operational assistance of the CSC.		✓
A-5	The grantee should incorporate the accepted VE proposals for the stations and Airport and City Center Guideway Segments at its earliest opportunity (in early Final Design).		✓
A-6	The grantee should complete any unfinished effort to acquire third party agreements with all affected agencies.		✓
A-7	The grantee should continue the process of updating the Project budget and schedule, incorporating information from contracts-in-progress and from completed tasks.		✓
A-8	The grantee should ensure that proper action is taken to resolve the issue of the location of the precast yard prior to the start of construction activities for the WOFH DB Contract. Such action is necessary to assure that the Project's critical path is not impacted and to determine what environmental documentation, if any, may be required by the FTA.		✓
A-9	The grantee should continue to be proactive in assuring that all of its contractors meet the requirements of Buy America and Ship America.		✓
Project Schedule Review			
B-1	The grantee shall address all schedule recommendations identified in the OP 34 deliverable.		✓
Project Cost Review			
C-1	The grantee should update the Right-of-Way portion of the 2011 SCC Estimate and Basis of Estimate, as it is not current with the drawings or planned methodology to acquire the Real Estate for the Project.		✓
C-2	The grantee should address any potential cost impact resulting from slippage of Notice to Proceed (NTP) dates for the selected or awarded DB contracts.		✓
C-3	The grantee should segregate the costs for Maintenance of Traffic (MOT) and Temporary Facilities for the "not awarded" contracts into SCC 40.08, similar to the segregation that occurred for this work scope in the "awarded" contracts within the SCC Summary Sheet.		✓
C-4	The grantee should improve its implementation of internal quality control and review of General Engineering Consultant (GEC) developed deliverables (cost estimates and schedule) prior to issuance to the FTA/PMOC for review.		✓
C-5	The grantee should revise its staffing plan when major revisions are made to the Project scope, MPS or Cost Estimate in order to synchronize the adjustments with resource allocation planning.		✓

No.	PMOC Recommendation	Prior to Final Design	During Final Design
Cost Reduction Measures Plan Review			
D-1	Any available expanded information of the proposed changes to stations (designs, plans, sections, architectural layouts, descriptions, details, estimates, etc.) should be provided to the PMOC.		✓
D-2	Site by site descriptions or plans should be provided for each station in which escalators are being eliminated; of particular concern is how or whether provisions are made for future additions of escalators in case of increased station ridership.		✓
D-3	Evacuation plans and capacity analyses should be provided or at least described for each station in which escalators are being eliminated.		✓
D-4	The grantee should provide the operations simulations that it performed for the proposed Ala Moana Station change for review.		✓
D-5	The grantee must obtain approvals for the elimination of guideway lighting and elevated walkways from the HART and HDOT officials currently overseeing system safety and provide them to the FTA.		✓
D-6	The grantee should revise its Cost Reduction Proposal estimate to include Systems elements (e.g., signals and traction power), real estate acquisitions, design (soft) costs, and uniform application of the Proposal's effects on contingency.		✓
D-7	The grantee must provide environmental documentation from the Cost Reduction Proposal to FTA for review and determination whether a supplemental EIS is required. This documentation would likely address changes to real estate needs, impacts on historic properties, and modifications to structures in or over streams.		✓
D-8	The grantee should address the reduction in its list of Secondary Mitigation Measures that would result from transfer of some of the items in that list to the baseline project.		✓
Project Management Plan Review			
E-1	The grantee should update the Staffing Plan and revisions to the organization chart due to the creation of HART, changes in PMC positions and grantee staff, and to adherence to the expectation of transitioning of PMC staff to grantee staff during the Final Design and construction phase of the Project.		✓
E-2	The grantee should update Figure 6 – Final Design Organization Chart of the PMP to include the Project Labor Agreement (PLA) Officer, Legal Counsel, and General Engineering Consultant (GEC) Safety and Security personnel positions that are currently unfilled.		✓
E-3	The grantee should update Figure 6 – Final Design Organization Chart of the PMP to add positions to the organization chart recommended by the PMOC in OP 21 section of this report.		✓
E-4	The grantee should update the PMP to address the new transit authority in detail since it commenced operations on July 1, 2011.		✓
E-5	The grantee should Expand the Construction Management and Testing and Start-Up sections during Final Design, as the requirements and the processes are further defined.		✓
E-6	The grantee should update and develop the DBB Resident Engineer and Inspection Manual prior to the start of the DBB construction contracts.		✓
Technical Capacity and Capability Review			
F-1	The grantee should provide direct support to the Executive Director through a Deputy (or a combination of executive managers). This recommendation should be addressed following identification of a permanent Executive Director.		✓

No.	PMOC Recommendation	Prior to Final Design	During Final Design
F-2	The grantee should develop a succession plan for those key management positions that may be considered short term (three years or less) in order to ensure a successful “knowledge transfer” of project consultants’ expertise to the grantee.		✓
F-3	The PMP, companion documents, and Project Control procedure documents must use consistent and traceable vernacular such as correct position titles, deliverable document titles, procedure titles, etc.		✓
F-4	The grantee should hire a recruiting consultant to assist with staffing plan, recruiting, training, transition planning and execution, and employee retention.		✓
F-5	The grantee should develop a Project Responsibility Assignment Matrix (RAM) similar to Figure 7 in the PMP in order to better document and clarify the roles and responsibilities, functions, and interface required among the blended organization of city department, city Project, and consultant staff.		✓
F-6	The grantee should hire a real estate acquisition consultant to meet peak resource demands and provide expert consultant advice as needed.		✓
F-7	The grantee should ensure that a separate and distinct group within the GEC is utilized to perform the reviews for building code and ADA compliance to streamline the permit process.		✓
QA/QC Review			
G-1	Clarification should be added to the QMP regarding the utilization and maintenance of the “Review Comments Log” and the “Change Management Log” with respect to tracking design changes.		✓
G-2	The “Project Wide Document Control Procedure” should reference and apply to all documents for the Project, not just those documents required in the QMP.		✓
G-3	The QMP should define the process by which the Deputy Chief Project Officer of Engineering and Construction (DEC) will verify that the identification and control of materials, parts, and components are performed during design, construction, and testing.		✓
G-4	The grantee should add requirements to the QMP regarding products and materials that will be turned over to the owner at the conclusion of the project.		✓
Safety and Security Management Plan Review			
H-1	The grantee should make revisions to the Safety and Security Management Plan (SSMP) as identified in the OP 22 deliverable.		✓
H-2	The grantee should address the organizational, staffing, and technical capacity issues raised by comments in the OP 22 deliverable.		✓
H-3	HDOT should accelerate the hiring process and select a qualified SOA Project Manager by February 2012.		✓
H-4	HDOT and HART should execute a Memorandum of Agreement (MOA) no later than the first quarter of CY 2012.		✓
H-5	HDOT should select an SOA consultant no later than the first quarter of CY 2012.		✓
Real Estate Acquisition and Management Plan Review			
I-1	The grantee should ensure that all real estate acquisition and relocation activities comply with the Record of Decision requirements.		✓
I-2	The RAMP should be updated to reflect organizational structure and policy changes associated with the new transit authority, HART, which went into effect on July 1, 2011.		✓

No.	PMOC Recommendation	Prior to Final Design	During Final Design
Rail Fleet Management Plan Review			
J-1	The grantee should make revisions to the Rail Fleet Management Plan (RFMP) as identified in the OP 37 deliverable.		✓

2.0 INTRODUCTION

Report Date	December 20, 2011 (REVISED FINAL)
Project Name / Location	Honolulu High-Capacity Transit Corridor Project Honolulu, Hawaii
Project Sponsor	City and County of Honolulu
Project Management Oversight Contractor (PMOC) firm	Jacobs Engineering Group Inc.
Person providing this report	Tim Mantych, PE (MO, IL)
Length of time PMOC has been assigned to this project:	Since November 18, 2009

The Federal Transit Administration (FTA) has contracted Jacobs to provide Project Management Oversight Contractor (PMOC) services on FTA’s New Starts and major capital projects. This Task Order provides FTA’s Office of Program Management (TPM) in Washington, DC with Project Management Oversight services for programmatic services and products for contract level plans, quality management systems and reporting, white papers, ancillary support, information technology services, and status reporting. Subject to the issuance of individual Work Orders by the Contracting Officer’s Technical Representative, the Contractor also provides PMO services for FTA’s Regional Offices’ grantees and their major capital projects to the extent that the PMOC has no conflicts of interest.

FTA assigned Jacobs as a PMOC for the City and County of Honolulu’s (“grantee”) Honolulu High-Capacity Transit Corridor Project (“Project” or “HHCTCP”) in 2009 for the purpose of monitoring the Project and providing FTA with “information and well-grounded professional opinions regarding the reliability of the project scope, cost, and schedule” of the HHCTCP. That effort continues with this report, which represents the PMOC’s (Jacobs) assessment of the Project’s readiness to enter Final Design.

2.1 Project Sponsor

The City and County of Honolulu (“grantee”) is sponsoring the Honolulu High-Capacity Transit Corridor (HHCTC) Project (“Project”).

2.2 Project Description

The proposed Project is a 20.05-mile “light metro” rail line in a grade-separated right-of-way that will provide high-capacity transit service on the island of Oahu from East Kapolei in the west to the Ala Moana Center in the east. The alignment is elevated except for a 0.6-mile at-grade portion adjacent to the Leeward Community College station. In addition to the guideway superstructure and trackwork, major physical elements of the Project include: 21 stations; one maintenance and storage facility; numerous right-of-way parcel acquisitions; and 80 “Light Metro” vehicles (identified as Heavy Rail Vehicles in SCC workbook) and associated core systems.

The Project is planned to be delivered in four design and construction segments:

- Segment I (West Oahu/Farrington Highway) – East Kapolei to Pearl Highlands (6 miles/7 stations)
- Segment II (Kamehameha Highway) – Pearl Highlands to Aloha Stadium (4 miles/2 stations)
- Segment III (Airport) – Aloha Stadium to Middle Street (5 miles/4 stations)
- Segment IV (City Center) – Middle Street to Ala Moana Center (4 miles/8 stations)

East Kapolei is the western terminus of the Project. The alignment begins at Kualakai Parkway north of Kapolei Parkway. The alignment follows Kualakai Parkway in a northerly direction to Farrington Highway where it turns east following Farrington Highway and crosses Fort Weaver Road. The alignment is elevated along Kualakai Parkway and along Farrington Highway. The alignment continues in a north-easterly direction following Farrington Highway on an elevated structure. South of the H-1 Freeway, the alignment descends to grade as it runs alongside the Maintenance & Storage Facility at the former Navy Drum Site. The alignment continues at-grade to Leeward Community College and then returns to an elevated configuration to cross over the H-1 Freeway. North of the Freeway, the alignment turns eastward along Kamehameha Highway. Segment I includes seven stations: East Kapolei, University of Hawaii at West Oahu, Ho’opili, West Loch, Waipahu Transit Center, Leeward Community College and Pearl Highlands.

Segment II carries the alignment from Pearl Highlands to Aloha Stadium, running mostly above the median of Kamehameha Highway. At the highway interchange west (or ‘Ewa) of the stadium, the alignment crosses over to the north (or mauka) side of Kamehameha Highway, in land adjacent to the roadway, which is currently used for stadium parking. Segment II includes two stations: Pearl Ridge and Aloha Stadium. East of Aloha Stadium Station, the segment features a third track for temporary train layovers or storage.

The Airport Segment, or Segment III, takes the alignment from Aloha Stadium to Middle Street. This entirely elevated section of the route starts on the north (or mauka) side of Kamehameha Highway, then transitions to the median of that street. As the route proceeds in the easterly (or Koko Head) direction, it leaves Kamehameha Highway to run on the southern (or makai) side of the elevated H-1 Freeway. At Honolulu International Airport, the alignment swings out over the median of the H-1, then down Aolele Street to a station site adjacent to the main airport terminal. The route then continues eastwardly (or Koko Head) on Aolele and, eventually along Ualena Street to Lagoon Drive. At that point, the alignment crosses a corner of Ke’ehi Lagoon Park and threads through another highway interchange to Kamehameha Highway again at Middle Street. Segment III includes four stations: Pearl Harbor, Airport, Lagoon Drive, and Middle Street.

The City Center Segment, Segment IV, is also entirely-elevated as it carries the alignment from Middle Street to the Ala Moana Center. Segment IV features guideway structures above Dillingham Boulevard, Nimitz Highway, Halekauwila Street, Queen Street, and Kona Street. Above Kona Street at the Ala Moana Center Station, the segment includes a third track to serve that station, which serves as the eastern terminus of the initial system. The segment includes eight stations: Kalihi, Kapalama, Iwilei, Chinatown, Downtown, Civic Center, Kaka’ako, and Ala Moana.

The Project also includes one Maintenance & Storage Facility (MSF), two park and ride lots, one park and ride structure and two bus transit centers. The rail vehicles will be fully-automatic and driverless.

The anticipated weekday boardings for the line are as follows:

- 97,500 (in 2019)
- 116,300 (in 2030)

2.3 Project Status

A Locally Preferred Alternative (LPA) was adopted in July 2008. The grantee was provided approval to begin Preliminary Engineering (PE) on October 16, 2009. The Final Environmental Impact Statement (FEIS) was published on June 25, 2010, and a Record of Decision (ROD) was issued on January 18, 2011. The grantee submitted a request to enter into Final Design for the Project in accordance with the FTA New Starts requirements on November 2, 2011.

2.4 Project Budget

The grantee's submitted an initial Base Cost Estimate (BCE) dated March 25, 2011. The initial estimate, referred to as the *2011 Standard Cost Category (SCC) Estimate* within this report, was \$5.213 billion in Year-of-Expenditure (YOE) dollars, including \$865.58 million in allocated and unallocated contingency and \$230 million in financing costs. However, in September 2011, the grantee proposed eight Cost Reduction Measures that resulted in the current Base Cost Estimate of \$5.126 billion in Year-of-Expenditure (YOE) dollars, including \$797.69 in total contingency (or 19.5%) and \$246.98 million in financing costs.

The October 2011 SCC Estimate (in YOE \$) for the project is shown in Table 3. The "Total" and "BCE" numbers in this table include the grantee's proposed Cost Reduction Measures as well as the PMOC's Recommended Adjustments that were identified during the OP 33 review. The PMOC's Recommended Adjustments are listed for information purposes only in this table.

Table 3. October 2011 SCC Estimate

SCC	Description	SCC Values (YOE \$)			PMOC Adjustments (YOE \$)
		Total	Contingency	BCE	
10	Guideway & Track Elements	1,321,473,000	164,872,000	1,321,473,000	44,600,000
10.04	Guideway: Aerial structure	1,213,907,000	152,686,000	1,061,221,000	35,000,000
10.08	Guideway: Retained cut or fill	7,402,000	973,000	6,429,000	0
10.09	Track: Direct fixation	94,857,000	10,436,000	84,421,000	9,600,000
10.11	Track: Ballasted	3,103,000	408,000	2,695,000	0
10.12	Track: Special (switches, turnouts)	2,204,000	369,000	1,835,000	0
20	Stations, Stops, Terminals, Intermodals	511,221,000	89,012,000	422,209,000	20,202,000
20.01	At-grade station	9,006,000	1,419,000	7,587,000	324,000
20.02	Aerial station	366,405,000	64,000,000	302,405,000	19,878,000
20.06	Automobile parking multi-story structure	77,918,000	12,855,000	65,063,000	0
20.07	Elevators, escalators	57,892,000	10,738,000	47,154,000	0
30	Support Facilities: Yards, Shops, Admin.	103,805,000	11,492,000	92,313,000	447,000
30.02	Light Maintenance Facility	8,511,000	979,000	7,532,000	0
30.03	Heavy Maintenance Facility	42,778,000	4,921,000	37,857,000	0
30.04	Storage or Maintenance of Way Building	8,742,000	1,006,000	7,736,000	0
30.05	Yard and Yard Track	43,774,000	4,586,000	39,188,000	447,000
40	Sitework & Special Conditions	1,021,458,000	132,994,000	888,464,000	0
40.01	Demolition, Clearing, Earthwork	19,917,000	2,680,000	17,237,000	0
40.02	Site Utilities, Utility Relocation	352,796,000	59,331,000	293,465,000	0
40.03	Haz. mat'l, contam'd soil removal/ mitigation	7,533,000	811,000	6,722,000	0
40.04	Environmental mitigation	36,382,000	4,188,000	32,194,000	0
40.05	Site structures (retaining walls, sound walls)	23,916,000	2,860,000	21,056,000	0
40.06	Pedestrian / bike access, landscaping	43,415,000	6,075,000	37,340,000	0
40.07	Automobile, bus accessways (roads, parking)	211,949,000	30,019,000	181,930,000	0
40.08	Temporary Facilities/other indirect costs	325,550,000	27,030,000	298,520,000	0
50	Systems	266,586,000	28,380,000	223,206,000	20,000,000
50.01	Train control and signals	107,601,000	9,923,000	82,678,000	20,000,000
50.02	Traffic signals and crossing protection	13,043,000	2,315,000	10,728,000	0
50.03	Traction power supply: substations	33,801,000	3,634,000	30,167,000	0
50.04	Traction power distribution	37,347,000	4,486,000	32,861,000	0
50.05	Communications	60,602,000	6,501,000	54,101,000	0
50.06	Fare collection system and equipment	10,324,000	1,106,000	9,218,000	0
50.07	Central Control	3,868,000	415,000	3,453,000	0
	CONSTRUCTION SUBTOTAL (10 - 50)	3,224,543,000	426,750,000	2,947,665,000	85,249,000

Table 3. October 2011 SCC Estimate (Continued)

SCC	Description	SCC Values (YOE \$)			PMOC Adjustments
		Total	Contingency	BCE	
60	ROW, Land, Existing Improvements	219,272,000	65,771,000	153,501,000	0
60.01	Purchase or lease of real estate	197,640,000	58,560,000	139,080,000	0
60.02	Relocation of existing households/businesses	21,632,000	7,211,000	14,421,000	0
70	Vehicles	212,461,000	22,764,000	189,697,000	0
70.01	Light Rail	191,657,000	20,535,000	171,122,000	0
70.06	Non-revenue vehicles	14,590,000	1,563,000	13,027,000	0
70.07	Spare parts	6,214,000	666,000	5,548,000	0
80	Professional Services	1,031,048,000	90,751,000	940,297,000	15,741,000
80.01	Preliminary Engineering	58,997,000	6,266,000	52,731,000	0
80.02	Final Design	222,178,000	18,439,000	203,739,000	1,600,000
80.03	Project Management for Design/Construction	350,329,000	27,343,000	322,986,000	1,000,000
80.04	Construction Administration & Management	187,915,000	17,172,000	170,743,000	0
80.05	Professional Liability/Non-Construction Ins.	56,104,000	5,127,000	50,977,000	9,500,000
80.06	Legal; Permits; Review Fees by other agencies	69,918,000	2,629,000	67,289,000	8,756,000
80.07	Surveys, Testing, Investigation, Inspection	6,073,000	528,000	5,545,000	0
80.08	Start up	79,534,000	13,247,000	66,287,000	(5,115,000)
	SUBTOTAL (10 - 80)	4,687,324,000	606,036,000	4,066,288,000	100,990,000
90	Unallocated Contingency	191,650,000	191,650,000	0	0
	SUBTOTAL (10 - 90)	4,878,974,000	797,686,000	4,066,288,000	100,990,000
100	Finance Charges	246,981,000	0	0	0
	TOTAL PROJECT COST (10 - 100)	5,125,955,000	797,686,000	4,313,269,000	100,990,000

Note: All values shown are in YOE \$. Grantee proposed Cost Reduction Measures are included in BCE values. PMOC Adjustments are included in BCE values and are only shown for information purposes.

2.5 Project Schedule

The following table presents the grantee's target dates for key milestones of this New Starts Project as identified in its Master Project Schedule (MPS):

Table 4. Grantee Target Milestone Dates

Milestone Description	Grantee Target Date
FTA Approve Entry into Final Design	14-Nov-11
FTA Award Full Funding Grant Agreement	01-Aug-12
WOFH/KH Revenue Service	27-Dec-15
Airport Segment Revenue Service	29-Oct-17
City Center Revenue Service	20-Sep-18
Grantee FFGA Revenue Service Date	17-Jun-19

Note: MPS Data Date of September 30, 2011

2.6 Project Background

The grantee is preparing to request approval to enter into Final Design for the Project in accordance with the FTA New Starts requirements. The Project is intended to provide improved

mobility in the highly-congested east-west corridor along Oahu's south shore. The Project would provide faster, more reliable public transportation services than those currently operating in mixed-flow traffic.

The Alternatives Analysis (AA) for the Project was presented to the Honolulu City Council in October 2006. The purpose of the report was to provide the City Council with the information necessary to select a mode and general alignment for high-capacity transit service on Oahu. The report summarized the results of the AA that was conducted following the FTA's planning guidance. The report provided information on the costs, benefits, and impacts of four alternatives:

- No Build Alternative
- Transportation Systems Management Alternative
- Managed Lane Alternative
- Fixed Guideway Alternative

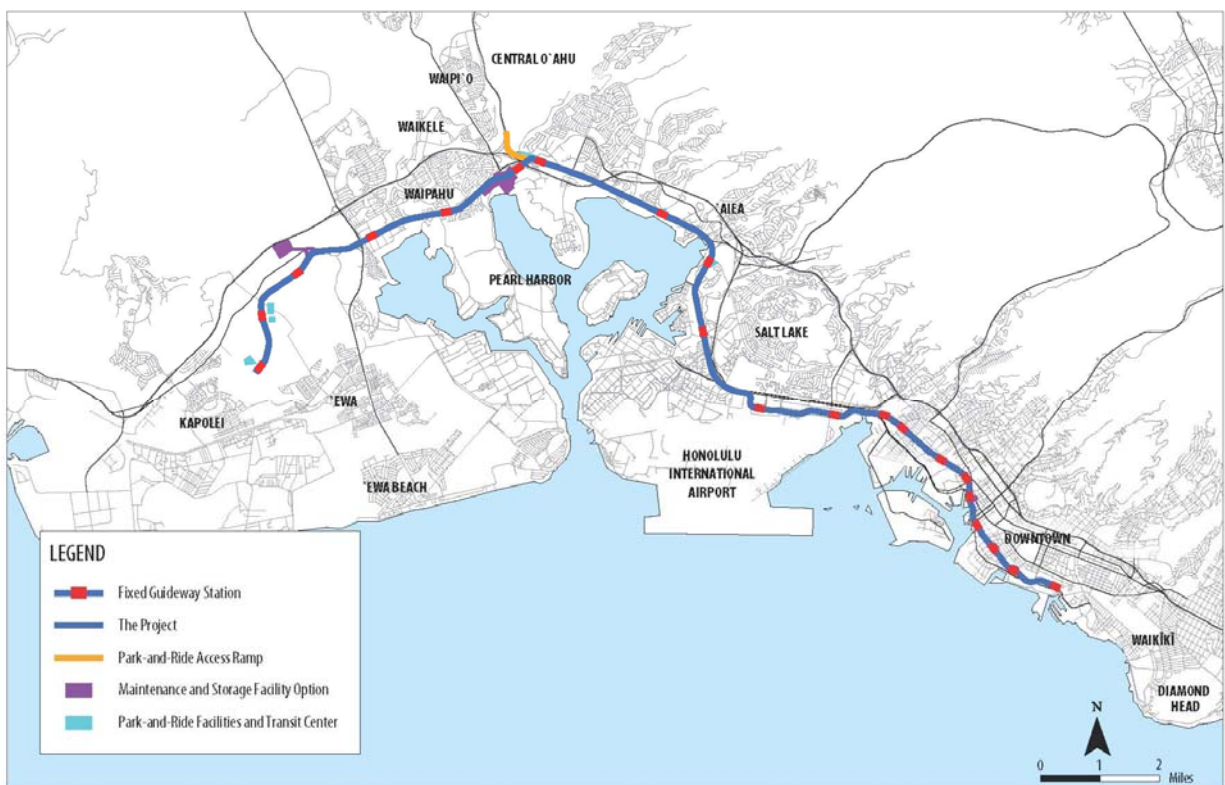
2.7 Project History

Following is a list of important dates in the history of the Project:

- August 2005 – AA is begun.
- October 2006 – AA Report presented to the Honolulu City Council.
- November-December 2006 – Public Meetings discussing the AA.
- December 22, 2006 – Honolulu City Council enacts Ordinance No. 07-001, which approved a fixed guideway alternative from Kapolei to the UH Manoa and Waikiki as the Locally Preferred Alternative (LPA) for the Project.
- January 1, 2007 – A 0.5% surcharge on the Hawaii General Excise Tax (GET) went into effect (until December 31, 2022).
- February 27, 2007 – Honolulu City Council approved as the Minimum Operable Segment (MOS), East Kapolei to Ala Moana Center, via Salt Lake Boulevard (Resolution 07-039, FD1(c)).
- July 1, 2007 – The City created the Rapid Transit Division (RTD) within the Department of Transportation Services (DTS) through enactment of the City's Fiscal Year 2008 Executive Operating Budget and Program.
- August 24, 2007 – The City executed a GEC contract for \$85 million to perform National Environmental Policy Act (NEPA) documentation, AA, and PE activities.
- February 22, 2008 – The City's Technology Selection Panel recommended the use of steel-wheel on steel-rail technology based on request for information industry responses submitted in January. Subsequently, Mayor Hannemann directed DTS to base the DEIS on steel-wheel on steel-rail technology.
- September 2008 – Pre-PE Risk Assessment performed for Salt Lake Alternative.
- November 2008 – A ballot measure was passed that, in part, approved the development of a "steel wheel on steel rail" transit system for the City of Honolulu.
- January 28, 2009 – City Council voted to revise the MOS alignment to the Airport Alternative.
- May 2009 – Request to Enter PE submitted.
- June 2009 – Pre-PE Risk Assessment performed for Airport Alternative.

- October 12, 2009 – FTA grants Entry into PE.
- June 25, 2010 – FEIS published.
- November 2, 2010 – Honolulu voters approved an amendment to the City Charter to create HART.
- December 16, 2010 – FEIS approved by Governor of Hawaii.
- January 18, 2011 – Project receives ROD from FTA.
- May 24, 2011 – FTA approves the grantee's request for a Letter of No Prejudice (LONP) to incur costs for limited Final Design activities for the West Oahu/Farrington Highway (WOFH) Design-Build (DB) contract in the amount of \$4.72 million.
- July 1, 2011 – Honolulu Authority for Rapid Transportation (HART) was established.

Figure 2. Project as Identified in FEIS



Following is a summary of the proposed Project component characteristics at the time this PMOC Report was prepared:

Guideway

- Exclusive guideway:
 - Majority of guideway will be elevated structure consisting of concrete box sections
 - 0.6-mile at-grade section in location of MSF will include no public grade crossings
- Double-track mainline
- Maximum speed: 55 miles per hour (mph)
- Crossovers spaced at approximately 2 miles

- Third Track at Aloha Stadium Station
- Third Track at Ala Moana Station

Stations

- 20 aerial stations (13 with concourses)
- One at-grade station (access from below platform circulation space)
- Station length: 240 feet
- Barrier-free

Maintenance and Storage Facility

- Initial construction will accommodate 80 revenue vehicles
- Maximum capacity of site is 150 revenue vehicles
- Shop Facility will include administrative and operational offices for the agency, including Operations Control Center (OCC)
- Facility will be designed and commissioned to achieve Leadership in Energy and Environmental Design (LEED) Green Building Rating System Silver Certification, and will be operated in accordance with FTA Sustainable Maintenance and Operational Standards

Revenue Vehicles

- Light Metro (identified as “Heavy Rail” in SCC workbook)
- Number of vehicles: 80
- Standard gauge, steel wheel on steel rail
- Fully automated, manual operation possible (hostler panel)
- Nominal vehicle dimensions:
 - Length: 64 feet
 - Width: 10 feet
 - Height: Up to 13.3 feet
 - Floor Height: 3.77 feet above top of rail (at entry)
- Nominal Passenger Capacity: 190 per vehicle (AW2 load)
- Electric traction via third rail, nominal 750V direct current (DC) supply, all axles powered
- Semi-permanently coupled, bi-directional trainsets
- Wide gangways between cars
- 2 to 3 double passenger plug doors per side (per car)
- Manual crew doors with steps
- Dynamic / regenerative braking
- Alternating current (AC) propulsion
- 30+ year design life

Systems

- Traction power
 - Distribution system will consist of substations and main line track power distribution facilities

- 17 Traction Power Substations or Gap Breaker Stations will be spaced at one to one-and-a-half mile intervals along the alignment with ratings in the range of 2 megawatt (MW) to 5 MW
- Power distribution system will be based on a 750-volt direct current (DC) third rail system
- Train control
 - Automatic train control technology
 - Driverless train operation
 - Two-minute Design Headway
 - Bi-directional operation
 - Fall-back manual train operation
 - Parallel and branch main lines
 - Mid-line Maintenance and Storage Facilities
 - Accurate station stopping
 - Operations Control Center
- Communications
 - Supervisory Control and Data Acquisition System
 - Optical Fiber Transmission System
 - Radio System
 - Telephone System
 - Public Address System
 - Variable Message Sign System
 - Closed Circuit Television System
 - Fire and Intrusion Alarm Systems
 - Maintenance Management Information System
- Fare Collection
 - Fare system will be integrated with the fare structure on the City's existing bus system
 - Proof of payment system

2.8 Project Management Oversight Contractor (PMOC)

This report represents the PMOC's assessment of the Project's readiness to enter Final Design. The following deliverables, as governed by the applicable FTA Oversight Procedures (OP), were provided under by the PMOC:

- OP 20 – PMP Review
- OP 21 – Technical Capacity and Capability Review
- OP 22 – SSMP Review
- OP 23 – RAMP Review
- OP 24 – QA/QC Review
- OP 27 – Before and After Study Reviews
- OP 32A – Project Transit Capacity Review
- OP 32C – Project Scope Review
- OP 32D – Project Delivery Method Review
- OP 33 – Capital Cost Estimate Review
- OP 34 – Project Schedule Review

- OP 37 – Fleet Management Plan Review (Bus)
- OP 37 – Fleet Management Plan Review (Rail)
- OP 38 – Bus and Rail Vehicle Technical Review
- OP 40 – Risk and Contingency Review

2.9 PE Approval Letter Requirements

Appendix C of this report provides a summary of the requirements identified in the Preliminary Engineering approval letter issued by the FTA on October 16, 2009, as well as their current status.

2.10 Evaluation Team

The following table presents the PMOC Evaluation Team and their respective roles associated with the assessment of the Project.

Table 5. PMOC Evaluation Team

Name	Location	Phone	Email Address	Role
Jacobs				
Tim Mantych	St. Louis, MO	314-335-4454	tim.mantych@jacobs.com	Program Manager
Bill Tsiforas	Las Vegas, NV	702-676-1568	William.tsiforas@jacobs.com	Task Order Manager
Keith Konradi	St. Louis, MO	314-335-4464	Keith.konradi@jacobs.com	Rail Engineering
Bob Niemietz	St. Louis, MO	314-335-4484	Robert.niemietz@jacobs.com	Structural Engineering
Ahmad Hasan	St. Louis, MO	314.335.4103	Ahmad.hasan@jacobs.com	Geotechnical Engineering
Allan Zreet	Dallas, TX	214-424-8511	Allan.zreet@jacobs.com	Architect
Greg Crocombe	Houston, TX	832-351-7271	Greg.crocombe@jacobs.com	Systems (Train Control)
Charles Neathery	Dallas, TX	214-424-7519	Charles.neathery@jacobs.com	Construction Management, Project Controls, Schedule Risk Assessment
Sabit Ghosh	Arlington, VA	410-837-5840	Sabit.ghosh@jacobs.com	Construction Management
Tim Morris	Dallas, TX	214-424-7506	Tim.morris@jacobs.com	Cost Estimating
Brian Carpenter	Dallas, TX	214-424-8530	brian.carpenter@jacobs.com	Cost Estimating, Scheduling
Steve Rogers	Dallas, TX	214-424-7522	Steve.rogers@jacobs.com	Cost Estimating
Albert Amos	Austin, TX	512-314-3122	Alber.amos@jacobs.com	Economics
David Nelson	Boston, MA	617-242-9222	David.nelson@jacobs.com	Operations, Transit Capacity
Tracey Lober	St. Louis, MO	314-335-4219	Tracey.lober@jacobs.com	QA/QC
Joe Leindecker	St. Louis, MO	314-335-4077	Joe.leindecker@jacobs.com	Planning
Virginkar and Associates, Inc.				
Arun Virginkar	Brea, CA	714-993-1000	virginkar.arun@va-inc.com	Vehicle Engineer, Buy America
Hal Edris	Spring Grove, PA	717-225-9630	edris.hal@va-inc.com	Systems Integration Manager
Triunity Engineering Management Inc.				
Jonnie Thomas	Denver, CO	303-953-0320	jonnie.thomas@triunityeng.com	Systems (Communications)
Interactive Elements Inc.				
Dennis Newman	New York, NY	212-490-9090	anoldsaw@aol.com	Safety
Dorothy Schulz	New York, NY	212-490-9090	dms10024@aol.com	Security
LS Gallegos				
JR Casner	Centennial, CO	303-790-8474	hcasner@lsgallegos.com	Construction Management, QA/QC
OR Colan & Associates				
Bob Merryman	St. Louis, MO	636-949-2125	rmerryman@orcolan.com	Real Estate
Kowalenko Consulting Group Inc.				
Emma Kowalenko	Chicago, IL	312-853-0500	ekowalenko@kowalenkogroup.com	Planning/Environmental
Independent Contractor				
David Sillars	Corvallis, OR	541-737-8058	dsillars@sillars.com	Risk Manager

2.11 Documents Reviewed

Appendix B provides a listing of the project-related documents that were utilized during development of this Spot Report.

2.12 OP 51 Report Format

For each item identified in OP 51, PMOC maintains a similar analytical approach to assure that all federal requirements are met and that the resulting conclusions are supported, complete, and clear:

- PMOC Assessment
- OP 51 Guidance/PMOC Response (if applicable)
- Conclusion
- Recommendations
 - Prior to entry to Final Design
 - After entry to Final Design

For all items listed in Sections 3.0 through 8.0, the PMOC performed each of following activities when assessing the grantee's readiness:

- (1) Reviewed and analyzed the pertinent information available for completeness, adequacy, consistency, and appropriate level of detail given the phase of the work
- (2) Identified all apparent discrepancies and deficiencies
- (3) Stated findings in descending order of importance (most likely, largest consequences, least likely, moderate/minor consequences) and made recommendations for modifications or additional work by the Grantee along with a time frame for the performance of the work
- (4) For major findings, provided recommendations for the Grantee and/or FTA to implement that will address the issue or correct or mitigate the deficiency
- (5) Identified action items, if any, and next steps
- (6) Documented the assessment, including objectives, approach/methodology, findings, and recommendations and provided back-up information in appendices or attachments to the main body of any report

3.0 SCOPE

The PMOC followed the requirements outlined in *OP 32A: Project Transit Capacity Review*, *OP 32C: Project Scope Review*, and *OP 32D: Project Delivery Method Review*, all dated May 2010, to verify that the scope of the project:

- Is represented by the totality of all contract plans and specifications
- is internally consistent
- is defined to a level appropriate for the project development phase
- is consistent with the estimated cost and schedule

3.1 PMOC Assessment

The scope as contained in the Project's Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) is reflected in the Preliminary Engineering (PE) plans, specifications, estimates, and the Project Management Plan (PMP).

The PE level drawings for the four line segments present right-of-way plans, drainage plans and details, demolition plans, guideway plans and profiles, typical cross sections, utility plans, roadway plans, signing and striping plans, maintenance of traffic plans, traffic signal plans, street lighting plans, structural drawings, landscaping plans, station drawings, and contact rail installation plans. The West Oahu/Farrington Highway (WOFH) DB Contract has progressed beyond the others, since its DB contractor has made revisions to profiles, track details, and structural definitions following receipt of its limited Notices to Proceed (NTPs).

The current design meets the capacity and operational objectives established in the FEIS, although details are subject to modification following the November 28, 2011 execution of the Core Systems DBOM Contract (CSC). The only item that changed since the ROD was issued is the total number of vehicles. At the time of the ROD, it was expected that the number of vehicles would be 76, but the BAFO by the selected CSC includes 80 vehicles. That is not a change in project scope, however, as the CSC bidders were allowed flexibility in order to meet the ridership projections defined in the CSC Request for Proposals (RFP) document and amendments. Thus, although the number of vehicles may change from 76 to 80 and the minimum headway may change from 3 minutes to around 2-1/2 minutes, the capacity and operational objectives are still met.

Attachment A to ROD, dated January 2011, listed 197 mitigations to which the Project is committed. These mitigations deal with subjects such as real estate acquisitions, easements, relocations, landscaping, design details, protection of historic and environmental sensitive resources, noise abatement, lighting, safety, security, public health, and the treatment of Hawaiian iwi. The grantee is committed to implementing all mitigation measures specified by the ROD and all terms of the Project's Programmatic Agreement (PA), also instituted in January 2011. The grantee is in the process of hiring a Kako'o Consultant to ensure compliance with the PA. While the actual implementation of many of the detailed mitigations will not occur until Final Design and construction, the grantee has included requirements for their design in RFPs already issued. Thus, the grantee has contractual assurances that the ROD's requirements will be met.

The grantee and its consultants and contractors are actively working to acquire other necessary permits and approvals from federal, local, and state agencies.

In order to minimize the risk normally related to differing site conditions, the grantee's engineers have conducted adequate site reconnaissance, performed sufficient subsurface investigation and field and laboratory testing, and prepared geotechnical data and baseline reports. Buried structure and utilities have been identified to the extent known. The location of potential contaminated soils has been identified in general.

Much of the work for subsurface investigation will take place during Final Design, although a comprehensive geotechnical investigation is taking place now on the West Oahu/Farrington Highway (WOFH) Design-Build (DB) Contract, Kamehameha Highway DB Contract, and MSF DB Contract. For sitework, the PE drawings and reports show a sufficient amount of project definition and justify moving into Final Design.

While these do not fall into the category of "discrepancies and deficiencies," the PMOC has nevertheless identified the following issues:

- (1) The grantee has developed an extensive Contract Packaging Plan that will require significant management effort to ensure that proper coordination occurs.
- (2) Cost and schedule controls, particularly associated with the DB contracts that have been awarded, must be effectively managed since Final Design will overlap with early construction.
- (3) The grantee has identified issues with the configuration of the Ala Moana Station (terminal) design that must be resolved.
- (4) The grantee has not incorporated the Value Engineering (VE) alternatives identified by the Stations VE team or Guideway VE team.
- (5) The grantee has not finalized several third-party agreements.
- (6) The Project budget must be updated to incorporate information from contracts-in-progress and from completed tasks.
- (7) The final determination for the location of the precast concrete facility is unresolved.

Through PE plans and performance specifications, the grantee has provided enough project information to fully illustrate the scope, capacity, level of service, functionality, and expected reliability of the completed project. The plans and specifications sufficiently characterize elements of the design and exceed the requirements of a PE design.

3.2 OP 51 Guidance/PMOC Response

- (1) *Definition of the project (i.e., scope) contained in the project ROD/FONSI and most recent New Starts submittal agree with the scope as developed in PE materials, including the approved PMP and the engineering design plans and specifications. Discrepancies or unclear scope items in the plans should be noted.*

The scope as contained in the project Record of Decision (ROD), dated January 18, 2011, is reflected in the PE plans, specifications, estimates, and the PMP.

- (2) *Basic quantities, such as number and locations facilities, peak and total vehicles, etc., identified in the environmental document and ROD/FONSI are the same as assumed in the current project definition.*

The only item that changed since the ROD is the total number of vehicles. At the time of the ROD, it was expected that the number of vehicles would be 76, but the Best and Final Offer (BAFO) by the selected CSC contractor includes 80 vehicles. That is not considered a scope change since the CSC bidders were allowed flexibility in order to meet the ridership projections defined in the CSC Request for Proposal (RFP) document and amendments.

- (3) *The current project design satisfies the capacity and operational objectives established in the approved environmental document.*

The current design meets the capacity and operational objectives established in the Final Environmental Impact Statement (FEIS), although details are subject to modification following the recent execution of the CSC. Thus, although the number of vehicles may change from 76 to 80 and the minimum headway may change from 3 minutes to approximately 2½ minutes, the capacity and operational objectives are still met.

- (4) *Mitigations committed to in the ROD (or project mitigation plans), when involving a physical or operational feature of the project, are incorporated, or are in the process of being incorporated, into the engineering design, proposed construction program, and/or other implementation plans. Mitigations could include changes in design, use of different types of material, modified traffic control, restricted construction activities, etc.*

Attachment A to ROD, dated January 2011, listed 197 mitigations to which the Project is committed. These mitigations deal with subjects such as real estate acquisitions, easements, relocations, landscaping, design details, protection of historic and environmental sensitive resources, noise abatement, lighting, safety, security, public health, and the treatment of iwi.

The grantee is committed to implementing all mitigation measures specified by the ROD and all terms of the Project's Programmatic Agreement (PA), also instituted in January, 2011. The grantee is in the process of hiring a Kako'o Consultant to ensure compliance with the PA.

While the actual implementation of many of the detailed mitigations will not occur until Final Design and construction, the grantee has included requirements for its design in RFPs already issued. Thus, the grantee has contractual assurances that the ROD's requirements will be met.

- (5) *Environmental and related early permits and approvals for project development have been executed or are in the approval process. Pre-construction, site reconnaissance and geotechnical surveys are complete.*

The FEIS was published on June 25, 2010, and a ROD was issued on January 18, 2011. The grantee and its consultants and contractors are actively working to acquire other necessary permits and approvals from federal, local, and state agencies.

In order to minimize the risk normally related to differing site conditions, the grantee's engineers have conducted adequate site reconnaissance, performed sufficient subsurface investigation and field and laboratory testing, and prepared geotechnical data and baseline reports. Buried structure and utilities have been identified to the extent known. The location of potential contaminated soils has been identified in general.

Much of the work for subsurface investigation will take place during Final Design, although a comprehensive geotechnical investigation is taking place now on the WOFH DB Contract, Kamehameha Highway DB Contract, and MSF DB Contract. For sitework, the PE drawings and reports have done a sufficient amount of work to provide project definition and justify moving into Final Design.

- (6) *PMOC shall examine the grantee's PE plans for clarity, accuracy, and level of detail for a project at or beyond the schematic design level. Information to be contained within the plan set prior to entry to Final Design is listed in Appendix C (of FTA's OP 51 Readiness to Enter Final Design).*

The PE drawings, specifications and other documentation far exceed the "schematic" threshold stated as a minimum requirement. The project is well-defined for a PE-level design. The PMOC's OP 32C – Project Scope Review describes the status of the project documentation and how it defines the scope of the project at the PE level. The following table presents the PMOC assessment of Design Checklist items identified in Appendix C of OP 51.

Table 6. Design Checklist (OP 51 Appendix C)

Requirement	Compliance
Grantee accepted design standards and performance requirements	✓
Digitized aerial photogrammetry	✓
Photo-simulations and/or schematic renderings	✓
Guideway general notes, standard abbreviations and symbols	✓
Guideway key map; horizontal and vertical controls	✓
Guideway alignment geometry (plan and profile)	✓
Guideway curve data (table and/or included in drawings)	✓
Typical sections	✓
Guideway drainage plans, including key map, notes and symbols	✓
General layouts of each grade crossing (MSF Yard only)	✓
Maintenance of traffic for special situations	✓
Pedestrian connections to the public way, transit accessways, auto parking, railroad crossings (latter for MSF Yard only)	✓
Bridge and wall nomenclature, symbols and abbreviations, and general notes	✓
Bridge and wall general plans and sections	✓
Bridge foundation, abutment, bent plans and deck plans	✓
Load diagrams for structures (e.g., aerial guideway)	✓
Retaining walls, including typical wall sections	✓
Tunnel layout plans	N/A
Tunnel structural plans and typical sections	N/A
Tunnel excavation plans, approach wall plans and sections	N/A
Other tunnel detail	N/A
Station and finishes general information, including notes and legend	✓
Architectural design of building/facilities plans, including footprint, floor plans, sections	✓
Station layout plans, sections, elevations	✓
Platform details	✓
Grading and drainage plans, site cross sections	✓
Urban design/general landscaping features	✓
Utilities, landscaping	✓
Paving for pedestrian access, transit access, and parking plans	✓
Aerial station plans showing basic structural and architectural elements, including platform details	✓
Tunnel (underground) station plans	N/A
Right of way limits	✓
Parcel/property acquisitions and easements, if known	✓
Roadway key map showing roadways plan with signalized and other intersections	✓
Roadway/pedestrian access plans and profiles	✓
Roadway typical sections	✓
Roadway drainage plans	✓
Signing plans	✓

✓ - Indicates compliance with FTA expectations

× - Indicates non-compliance with FTA expectations

3.3 Conclusion

It is the PMOC's professional opinion that the current scope is sufficiently defined and that it meets the FTA guidance and requirements necessary to advance the Project into the Final Design phase.

3.4 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) Once the CSC is given an NTP, the grantee must work with that contractor to resolve capacity issues (see OP 32A deliverable) and implement project controls to coordinate CSC work with that of other contractors.
- (2) The grantee needs to expand its review and project management staff as planned per its PMP in order to maintain control of the various concurrent projects.
- (3) The grantee must manage the schedule and budget by implementing controls as described in its project management plans early in Final Design. This is particularly true for those DB projects already awarded, as Final Design overlaps with early construction.
- (4) The grantee should resolve its Ala Moana Station design, whether by incorporating suggestions made by the Stations Value Engineering (VE) team or by other means, perhaps with the operational assistance of the CSC.
- (5) The grantee should incorporate the accepted VE proposals for the stations and Airport and City Center Guideway Segments at its earliest opportunity (in early Final Design).
- (6) The grantee should complete any unfinished effort to acquire third party agreements with all affected agencies. While most of these agencies have shown a willingness to cooperate with the grantee, nothing can be guaranteed about the success of these relationships until agreements are in place.
- (7) The grantee should continue the process of updating the Project budget and schedule, incorporating information from contracts-in-progress and from completed tasks.
- (8) The grantee should ensure that proper action is taken to resolve the issue of location of the precast yard to the start of construction activities for the WOFH DB Contract. Such action is necessary to assure that the Project's critical path is not impacted and to determine what environmental documentation, if any, may be required by the FTA.
- (9) The grantee should continue to be proactive in assuring that all of its contractors meet the requirements of Buy America and Ship America.

4.0 PROJECT SCHEDULE

The PMOC followed the requirements outlined in the *FTA OP 34 – Project Schedule Review*, dated May 2010, to assess and evaluate the grantee’s project schedule. The schedule review evaluates the efficiency and effectiveness of the grantee’s project implementation during any phase of the project life cycle. The schedule review validates the inclusivity of the Project scope and the characterization of individual project elements within the current Project phase. It also validates the program management’s readiness to enter and implement the next major program phase, the Final Design phase. The review of the Project schedule addresses seven subcategories:

- Schedule
- Technical Review
- Resource Loading
- Project Calendars
- Interfaces
- Project Critical Path
- Critical Areas of Concern

4.1 PMOC Assessment

The PMOC reviewed nine project schedule submittal packages and conducted four forensic scheduling workshops in an effort to support the grantee’s development of the master schedule, procedures, and modifications to the project controls organizational structure. Through numerous reviews documented in PMOC’s OP 34 deliverable, the PMOC determined the grantee met the requirements related to “*completeness, adequacy, consistency, and level of detail.*”

The PMOC Schedule Review report format is consistent with OP 34 and addresses the following subcategories:

- Technical Review
 - Format
 - Structure, quality, and detail
 - Mechanical soundness
 - WBS
 - Phasing and sequencing
 - Hierarchy
 - Cost and resource loading
 - Schedule Contingency
 - Constraints
 - Schedule Control
- Project Activities and Constraints
 - Sequencing
 - Resource Loading
 - Schedule Elements

The Schedule Review categories systematically characterized each element in the project/program schedule, from schedule development and performance measurement through

post project archive record documentation. The Schedule Review evaluated the efficiency and effectiveness of the project sponsor's project implementation during any phase of the project life cycle.

The Schedule Review validated the inclusivity of the Project scope and the characterization of individual project elements within the current Project phase. It also validated the program management's readiness to enter and implement the next major program phase, the Final Design phase.

The PMOC has identified a significant number of recommendations and opportunities to strengthen the integrity of the grantee's Project Controls organization, procedures, plans, technical schedule input, and technical capacity and capability. The PMOC expects the grantee to incorporate these recommendations during the Final Design phase and prior to submission of refreshed cost estimate and schedule documents in support of its FFGA Application.

The following table includes the OP 34 topics that have PMOC recommendations and actions the grantee must address during the Final Design phase. Only the OP 34 review topics that include PMOC recommendations have been included. Each review topic contains a varying number of PMOC recommendations as indicated in the table's second column. Each review topic is also ranked according to likelihood of impact if not successfully addressed (see Columns 3-5).

Table 7. OP 34 Recommendations with Action Rating

Schedule Review Topic	No. of Actions	Action Rating w/ Impact		
		Most Likely	Moderate	Least Likely
(9) Schedule control, methods, tools and organization.	6	X		
(3) Mechanically Correct	3	X		
(2) Structure, Quality & Detail	5		X	
Technical Review (1) - Sequencing, similar activities, labor and materials, ROW activities, site logistics	3		X	
(5) Phasing, sequencing, Critical Path, Material Tasks and efficient work sequence,	2			X
(7) Cost/Resource Loading	1			X

The following table presents the PMOC assessment of Schedule Checklist items identified in Appendix C of OP 51.

Table 8. Schedule Checklist (OP 51 Appendix C)

Requirement	Compliance
All major Final Design activities indicated	✓
For each design discipline (civil, structural, systems, other) detail provided on scope/main tasks	✓
All early permits identified as a milestone or more detailed activity if possible	✓
Carryover/incomplete activities from PE identified	✓
Milestones for 60%, 90%, and 100% (or similar percent) complete indicated	✓
o Logic ties to predecessor activities shown	✓
o Required reviews and approvals indicated	✓
Logic ties between other major activities shown	✓
Advertise and Bid for construction packages indicated; single activity for advertise/bid acceptable	✓
Logic ties provided from design to advertise/bid and from advertise/bid to construction	✓
Construction outline level of detail, including	✓
o Each construction package indicated	✓
o Five to 15 activities per package, depending on size	✓
Utilities outline level of detail, including	✓
o Which utilities affected by project	✓
o Estimated timeframe/duration of utility work	✓
o Design detail included in Final Design section of schedule	✓
Real Estate level of detail, including	✓
o Several basic activities included for each construction package	✓
o Logic ties shown from design to real estate and from real estate to construction	✓
Final Testing and Startup single activity indicating duration and predecessor logic acceptable	✓
For phased openings, preliminary detail (e.g., milestones) provided	✓
Placeholder for safety certification acceptable"	✓

✓ - Indicates compliance with FTA expectations

× - Indicates non-compliance with FTA expectations

4.2 OP 51 Guidance/PMOC Response

- (1) *The PMOC shall determine whether the level of detail (number of activities) and logic (activity interrelationships) are reasonable and sufficient for project design at entry to Final Design. Assessment will be made of major activity and overall project durations, leading to a conclusion on whether the project can be completed as planned;*

The PMOC found that the number of activities and the relationship between them are reasonable and sufficient for the project's entry to Final Design.

Though a dynamic process, the grantee has demonstrated that the MPS and BOS contain a sufficient amount of duration (production, efficiency, contingency) for each project life cycle phase. The PMOC risk assessment accounted for contingencies, or lack thereof, for the current planning and final design phases.

- (2) *Risks to the schedule will be identified and areas requiring clarification and/or additional detail described;*

The PMOC conducted qualitative brainstorming sessions with the grantee and its consultants during Risk Workshop 2, held April 6-7, 2011. The purpose of the

workshop was to identify a listing of program risks with both cost and schedule impacts. Prior to the workshop, the PMOC reviewed and modified a risk register prepared for the grantee's independent risk assessment. The PMOC noted that the grantee's risk register was very detailed and contained a considerable number of risks also identified by the PMOC risk assessment team.

- (3) *Consistency between the time sensitive variables in the capital cost estimate, including year of expenditure assumptions, and durations incorporated into the master schedule shall be examined;*

The estimate is reflective of the sequencing identified in the MPS. The schedule was used to calculate escalation at reasonable rates and for the durations contained in the MPS activity codes.

- (4) *A Work Breakdown Structure (WBS) has been developed and a base CPM schedule and budget are in place and are consistent with the project plans. The WBS must be consistent with the analyzed plan and program for all project participants' agreed upon roles, responsibilities, capabilities and capacities.*

The grantee has developed a WBS and a base CPM schedule and budget that are consistent with the project plans. In addition, the grantee's schedule is reflective of the project scope represented in the plans and is congruent with the project estimate. The data below the summary levels generally provide adequate detail to differentiate between major project segments and contracting areas. The MPS can be sorted by project phase (PE / Design / Construction / Startup & Testing), Project Segment, or by Project Contract, as identified in the Contract Packaging Plan. The MPS activity detail is sufficient to determine the type of work that is being performed and is traceable and transparent with the Contract Packaging Plan. The MPS can be organized and sorted by contract, project segment, and opening, and is flexible and robust enough to project executive summary level reporting.

4.3 Conclusion

It is the PMOC's professional opinion that the current Master Project Schedule (MPS) is mechanically correct and fundamentally sound, and that it meets the FTA guidance and requirements necessary to advance the Project into the Final Design phase.

4.4 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

Structure, Quality & Detail

- (1) The grantee should combine all of the various schedule types into one all-encompassing schedule file to make it a true MPS. The PMOC does, however,

recommend keeping the construction contractor schedules separate and integrating only summary level information from these schedules into the MPS. The Scheduling Procedures and PMP require revision to address any Schedule Breakdown Structure (SBS) changes.

- (2) The grantee's Organizational Breakdown Structure (OBS), specific to the Project Controls department, should be aligned with the positions, schedule types, SBS, and references made in all PMP and related project control procedures and contractual requirements.
- (3) More detail is needed in the MPS to address construction activity, utility work, real estate acquisition, long-lead material and equipment procurement, and milestone integration among the construction contracts.
- (4) The grantee should institute a formal schedule file naming convention for the MPS and for all the other Feeder Schedules including the Contract Project Schedules (CPS).
- (5) The grantee should identify a means to utilize its document management system to formally transmit its Schedule Submittal Packages to the FTA and PMOC.

Mechanically Correct

- (6) The grantee should incorporate the Permit Schedule, Procurement Schedule and Utility Schedule into the MPS as addressed in the Project Scheduling Procedure.
- (7) The grantee should further reduce the number of activity logic ties that contain an excessive amount of lag due to Start-Start (SS), Start-Finish (SF), and Finish-Finish (FF) relationship types. Most of this can be accomplished with the addition of more activity detail using Finish-Start (FS) relationship ties, greatly improving the logic.
- (8) The grantee should expand proposed construction activity detail to a level that better connects the multiple contract and key interface logic points.

Phasing and Sequencing, Critical Path, Material Tasks and efficient work sequence

- (9) Additional activity detail is necessary to more accurately represent document preparation, risk assessment, financial capacity plan preparation and review, entry into Final Design, and FFGA application activities.
- (10) More material tasks detail should be incorporated into the MPS.

Cost/Resource Loading

- (11) The grantee should ensure that resource and cost loading requirements are included in all construction contractor contractual requirements.

Schedule control, methods, tools and organization

- (12) The key project control positions should be consistently referred to in the PMP and companion documents and project control procedures.
- (13) The grantee project controls department should be co-located with all GEC project control management support staff (not including the GEC Resident Engineer team field staff, once construction begins).

- (14) The grantee should implement all schedule management procedures and guidelines as documented in the PMP and its respective project control companion documents.
- (15) The grantee should define a standardized reporting format and distribution for all Project Scheduling parties.
- (16) The grantee should standardize all scheduling software settings and incorporate the requirements in all construction contractual documents.

Schedule Sequencing, similar activities, labor and materials, sequencing of ROW activities, temporary construction and site logistics

- (17) The MPS needs more activity detail for all construction contract activities, as the MPS typically includes only one activity for each construction contract. More construction activity detail is required to better enable integrated connection points among the various design and construction contracts.
- (18) The MPS needs activities representing the logistics of site access and management and general planning and use of staging yards, including pre-cast concrete yards.
- (19) The grantee should provide more justification for the construction activity durations for station, elevator and escalators, utilities, and core system contract elements.

5.0 PROJECT COST

The PMOC followed the requirements outlined in the *FTA OP 33 – Capital Cost Estimate Review*, dated May 2010, to assess and evaluate the grantee's cost estimate. Specifically, the review addresses:

- Soundness of the grantee's cost estimating methods and processes compared with proven professional quantity surveying and cost estimating practices for projects of this scale
- Congruence of the project cost estimate with the project scope and schedule
- Reliability of the estimate for procurements, contract bids, and contract closeout

The grantee's submitted an initial Base Cost Estimate (BCE) dated March 25, 2011. The initial estimate, referred to as the *2011 Standard Cost Category (SCC) Estimate* within this report, was \$5.213 billion in Year-of-Expenditure (YOE) dollars, including \$865.58 million in allocated and unallocated contingency and \$230 million in financing costs. However, in September 2011, the grantee proposed eight Cost Reduction Measures that resulted in the current Base Cost Estimate of \$5.126 billion in Year-of-Expenditure (YOE) dollars, including \$797.69 in total contingency (or 19.5%) and \$246.98 million in financing costs. The current YOE budget for the project, including allocated and unallocated contingency, is shown in Table 3.

5.1 PMOC Assessment

The PMOC evaluated the cost estimates for each SCC for mechanical soundness and consistency. These mechanical checks are used to determine if there are any material inaccuracies within the estimate. The *2011 SCC Estimate* was found to be mechanically correct in the tabulation of the unit cost, application of factors, and translation to the SCC workbook. The PMOC randomly sampled cost estimate line items to determine if the cost estimate backup cross-walked into the SCC workbook. In each instance, the PMOC found the calculated values translated to the SCC workbook and back to the cost estimate backup without variance or mechanical issues.

The estimate is reflective of the sequencing identified in the Master Project Schedule (MPS). The schedule was used to calculate escalation at reasonable rates and for the durations contained in the MPS activity codes. The bids contain YOE escalation, so the grantee was able to develop base year and YOE costs mathematically for the *2011 SCC Estimate* from a combination of bids and estimate values.

The PMOC did not find any significant discrepancies between the MPS and cost estimate line items within SCC or contract package Work Breakdown Structure (WBS) sorts. Furthermore, no significant issues were identified for missing scope or erroneous schedule durations.

The following items summarize specific PMOC observations of the *2011 SCC Estimate* per the OP 33 requirements:

- (1) The PMOC concludes that the estimate is consistent with the project scope identified in the FEIS and ROD.
- (2) The PMOC has characterized the project cost data as an AACE "Class 2" estimate due to the bottoms-up style of estimate and receipt of bids for design build portions of the project scope. To date, the grantee has awarded \$1.933 billion of

the \$4.983 billion of planned contracts, or 38.8%, including contingency. Without considering contingency, the percentage is 43.6%.

- (3) Soundness & reliability of the Grantee's Estimate – The grantee's *2011 SCC Estimate* was prepared utilizing standard industry practices combined with highly regarded Timberline estimating software and a reasonable and reliable database. The database contains adjusted local rates that include constructions, environmental, real estate, permitting, bonds and insurance, and related general conditions and soft cost markup factors. It has been proven reliable thus far, as awards of approximately 43% of the planned contracts have occurred. PMOC reviewed the project budget for congruence, incorporation, and coordination of the project scope & schedule and found it to fall within a reasonable range.
- (4) The PMOC accepted the percentages used by the grantee for escalation in its *2011 SCC Estimate*.
- (5) The PMOC verified that the grantee appropriately included the General Excise Tax in its estimate, as it has not received exemption from this requirement.
- (6) The PMOC verified that the grantee included an appropriate level of detail and supportable justification in the Basis of Estimate for general condition costs.
- (7) The cost estimate included some line item "Allowance" costs that contained minimal quantification or detail backup. The Allowance line item totals just over \$86 million, or 1.65% of the total Project estimate. The PMOC found the use of Allowance line items acceptable and not excessive for a cost estimate prepared prior to entry into the Final Design phase.
- (8) The PMOC evaluated the DB bids and the grantee's approach for contract evaluation, post bid analysis and award.
 - The grantee has awarded two DB guideway sections; one (WOFH) was substantially less than the engineer's estimate and one (KH) was not. The MSF bid was within the budget, and the CSC DBOM was less than the estimate. Risk still exists for these projects due to pending resolution of protests for the CSC and delays in NTPs for the remaining bids. The PMOC accounted for these risks in its analysis sensitive to the information available at the time of the modeling.
 - The grantee is following its outlined procurement process, which has proven successful to date.
 - Because the bids are prepared using lump sum line items, the SCC format distributions are provided after NTP, which makes spot checking awarded contract line item quantification and unit pricing difficult.
- (9) The grantee's *2011 SCC Estimate* was prepared utilizing standard industry practices combined with highly regarded Timberline estimating software and a reasonable and reliable database. The estimate is substantiated in part from bid results obtained from the award of the DB portions of the work during 2010/2011.
- (10) The PMOC identified 22 suggested adjustments to the cost estimate. These adjustments totaled an addition of \$100,990,000 and were used to develop an Adjusted Base Cost Estimate. The input for the Cost Risk Model and basis for the evaluation of project cost contingency is the Adjusted BCE, which is the BCE net of contingencies and finance costs and includes the PMOC adjustments.

5.2 OP 51 Guidance/PMOC Response

Following are specific items identified in OP 51 and the corresponding PMOC response:

- (1) *The PMOC shall evaluate the project cost estimate and verify that it is in general agreement with the latest Standard Cost Category cost information contained in the grantee's most recent New Starts submission.*

The PMOC concludes that the estimate is consistent with the project scope identified in the FEIS and ROD. The PMOC did not find any significant discrepancies between the MPS and cost estimate line items within SCC or contract package WBS sorts.

- (2) *The PMOC shall determine whether the cost estimate is consistent with the project scope as defined in the drawings and specifications.*

The PMOC concludes that the estimate is consistent with the project scope identified in the FEIS and ROD.

The review of the cost estimate revealed that each of the major elements for the project included an estimated cost. As noted within this report, the PMOC checked a sampling of quantities from the cost estimate. The values were found to be consistent with the scope drawings. Quantity take offs were performed by the grantee estimating team. Documentation of these take-offs was supplied to the PMOC via the Timberline cost estimate electronic file.

- (3) *The PMOC shall assess whether the estimate includes sufficient detail to establish a reasonably accurate cost for project development through construction and start-up. If based on quantities/activities and unit costs, are the quantities/activities adequately defined? What prices are lump sums versus based on market research or quotes from potential suppliers/vendors? Further, the PMOC shall ascertain that the grantee has sought and received "industry review" of the construction/procurement schedule and interfaces contracting terms, special conditions and baseline estimating for a representative sample of major construction and equipment procurement contract packages planned.*

With the exception of the adjustments listed in its OP 33 deliverable, the PMOC determined that the current cost estimate is mechanically and fundamentally sound and reasonable as it meets the FTA guidance and requirements necessary to advance the Project into the Final Design phase.

The quantities/activities and unit costs are adequately defined. As noted in PMOC's OP 33 report, 43% of the 2011 SCC Estimate value is associated with awarded DB contracts. The remaining estimate value is based on advanced PE documents, which were reviewed by the PMOC in support of OP 32C deliverable. The PMOC reviewed the Basis of Cost Estimate and the Basis of Schedule to verify transparency and traceability of assumptions used to justify the costs and durations associated with each Project scope element and SCC.

- (4) *Allocated and unallocated contingencies shall be identified and a professional judgment offered as to the adequacy of contingencies, given project risks, complexity, and other factors.*

Risk assessment analyses (per the requirements of OP 33 and OP 40) have confirmed that adequate allocated and unallocated contingencies have been included in the total project cost based on the perceived project risk.

5.3 Conclusion

It is the PMOC's professional opinion that the current cost estimate is mechanically and fundamentally sound and reasonable, and that it meets the FTA guidance and requirements necessary to advance the Project into the Final Design phase.

5.4 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) The grantee should update the Right-of-Way portion of the 2011 SCC Estimate and Basis of Estimate, as it is not current with the drawings or planned methodology to acquire the Real Estate for the Project. The cost estimate can be revised during the Final Design phase to account for more detail and definitive real estate pricing. The PMOC has determined that the cost estimate contingency amounts sufficiently cover similar items that lack definitive information at this phase of the Project.
- (2) The grantee should address any potential cost impact resulting from slippage of Notice to Proceed (NTP) dates for the selected or awarded DB contracts. The cost estimate can be revised during the Final Design phase to account for more detail and definitive information related to future contract awards and NTP. The PMOC has determined that the cost estimate contingency amounts sufficiently cover similar items that lack definitive information at this phase of the Project.
- (3) The grantee should segregate the costs for Maintenance of Traffic (MOT) and Temporary Facilities for the "not awarded" contracts into SCC 40.08, similar to the segregation that occurred for this work scope in the "awarded" contracts within the SCC Summary Sheet. This can be completed when updating the cost estimate during Final Design.
- (4) The grantee should improve its implementation of internal quality control and review of General Engineering Consultant (GEC) developed deliverables (cost estimates) prior to issuance to the FTA/PMOC for review. The PMOC noted similar issues with the schedule and related project control deliverables as they lacked consistency with naming conventions, transmittals, incomplete information and non-conformance to its procedures
- (5) The grantee should revise its staffing plan when major revisions are made to the Project scope, MPS or Cost Estimate in order to synchronize the adjustments with

resource allocation planning. Major revisions include significant delay to contract letting or execution, contract package revisions, changes to contract delivery methods, etc., or the addition of professional service contracts, etc.

6.0 COST REDUCTION MEASURES

The grantee identified several capital cost reduction measures as part of the base case capital cost estimate assumed in the September 2011 revised draft financial plan. These Cost Reduction Measures were proposed to address lower net General Excise Tax (GET) surcharge revenues. In addition, the grantee identified certain cost elements as having the potential to be deferred and paid for on a pay-as-you-go basis without adversely affecting the overall project schedule. The net change of \$87 million is calculated as the difference between the Capital Cost Reductions (\$104 million deduction) and Financing Cost Changes (\$17 million addition).

The PMOC has reviewed the grantee's eight (8) proposed Cost Reduction Measures. In general, the PMOC agrees with the premise of each Cost Reduction Measure. However, the PMOC also notes that the scope detail to support many of the Cost Reduction Measures is minimal, at best. The grantee must ensure that detailed design is completed early in Final Design to support both the scope changes and the associated cost estimates.

The grantee must modify the Project Schedule to reflect the changes, which, while likely to reduce construction time, may have an adverse effect on design time. It is also imperative that the grantee assure that other aspects of the project are not degraded as a result of implementing these Cost Reduction Measures, such as Safety and Security, capacity, operations, maintainability, and service to the community.

6.1 Conclusion

In general, the PMOC agrees with the premise of each Cost Reduction Measure. However, the PMOC also notes that the scope detail to support many of the Cost Reduction Measures is minimal, at best. These cost reduction measure values must be validated after more detailed supporting documentation is developed early in Final Design.

6.2 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) Any available expanded information of the proposed changes to stations (designs, plans, sections, architectural layouts, descriptions, details, estimates, etc.) should be provided to the PMOC.
- (2) Site by site descriptions or plans should be provided for each station in which escalators are being eliminated; of particular concern is how or whether provisions are made for future additions of escalators in case of increased station ridership.
- (3) Evacuation plans and capacity analyses should be provided or at least described for each station in which escalators are being eliminated. Any change in compliance with ADA should also be addressed.
- (4) The grantee should provide the operations simulations that it performed for the proposed Ala Moana Station change for review.

- (5) The grantee must obtain approvals for the elimination of guideway lighting and elevated walkways from the HART and HDOT officials currently overseeing system safety and provide them to the FTA. As part of its plan, the grantee would be expected to:
 - Prepare an emergency evacuation plan, in coordination with the Honolulu Fire Department
 - Address night-time evacuation without guideway lighting
 - Perform Threat and Vulnerability Analyses and Preliminary Hazard Analyses
 - Address advisability of safety railings along the walkway
- (6) The grantee should revise its Cost Reduction Proposal estimate to include Systems elements (e.g., signals and traction power), real estate acquisitions, design (soft) costs, and uniform application of the proposal's effects on contingency.
- (7) The grantee must provide environmental documentation from the Cost Reduction Proposal to FTA for review and determination of whether a supplemental EIS is required. This documentation would likely address changes to real estate needs, impacts on historic properties, and modifications to structures in or over streams.
- (8) The grantee must reevaluate its Secondary Mitigation Measures to ensure that Secondary Mitigation Capacity is not reduced with the adoption of the proposed Cost Reduction Measures.

7.0 PROJECT RISK

The PMOC followed the requirements outlined in the *OP 40 – Risk and Contingency Review*, dated May 2010, to assess and evaluate the Project.

7.1 PMOC Assessment

- (1) The early bidding for DB guideway and MSF work and design-build-operate-maintain systems and vehicles work has significantly reduced market risk, since competitive pricing has been received and incorporated into its estimates.
- (2) Most design risk and much construction risk associated with this work has been transferred to the contractors through their pricing, and therefore the budget already includes these risks.
- (3) However, the early contracting of this work has created a potential for technical performance risk, since the grantee must develop a new project organization to manage a quickly-developing and very large construction effort.
- (4) In addition, this is an extremely large project, and historically such projects are found to exhibit high-risk profiles.
- (5) Other project-specific risks include inefficiencies due to a potentially high number of individually-awarded station, design, and guideway contracts for the remaining work, and a potentially un-competitive bid market due to market perceptions of advantages held by the current contractor.
- (6) Further, the remaining work on this project extends into increasingly-dense urban areas, increasing the risk of third-party interferences and unexpected underground utility and archaeological conditions.
- (7) The grantee has developed a formal Risk and Contingency Management Plan (RCMP) that:
 - conforms to the structure suggested in OP 40
 - includes a corresponding organizational structure that will ensure full, unbiased risk management throughout the project life
 - monitors and mitigates high-risk rated items through implementation of the RCMP
 - establishes a management structure for risk identification, assessment, and mitigation that has sufficient independence to manage risk without bias and to provide reliable risk reports to agency upper management
 - includes a contingency management, release, and tracking mechanism
 - includes cost and schedule contingency draw-down curves
 - establishes corrective action plans to be used if it becomes evident that its contingency levels may fall below the limits established in the contingency draw-down curve
 - identifies potential Secondary Mitigations and the timing at which these mitigation options are no longer available (such secondary mitigations should not materially impact service and operating commitments)
 - Targets a possible \$267 million in secondary mitigation options
- (8) The PMOC prepared a “weighted” contingency evaluation and determined that, in consideration of the findings of the risk review, the PMOC recommends that the

- grantee's budget not change.
- (9) The Schedule Contingency Review Analysis calculation generates a Revenue Service Date (RSD) date of December 2019. The PMOC believes that this calculation is within reason as it falls on the 60th percentile of the PMOC's schedule risk assessment model. However, the PMOC recommends the FFGA RSD should be no earlier than January 2020.

7.2 OP 51 Guidance/PMOC Response

“Between PE and Final Design, project scope, schedule, and cost are subject to intensive reviews as described in separate OPs. These reviews culminate in a risk assessment and the development of a risk management plan. The risk assessment identifies risk, assesses it, considers mitigation approaches, and develops a risk management plan to inform the grantee's project management practices.”

Per FTA Oversight Procedure (OP) 40, PMOC has performed “an evaluation of the reliability of the grantee's project scope, cost estimate, and schedule, with special focus on the elements of uncertainty associated with the effectiveness and efficiency of the grantee's project implementation and within the context of the surrounding project conditions.” Through the process of risk and contingency review, the PMOC attempts to aid the grantee in its efforts to better define the project's risks and to provide avenues for recovery should those risks become reality.

PMOC's OP 40 deliverable provides recommendations for adjustments to scope, cost, and project delivery options and risk mitigation options and alternatives, particularly in regard to contingencies, in order to respond to established project risks.

7.3 Conclusion

The PMOC has determined that the grantee has satisfied the guidelines and requirements specific to risk management. The grantee should hold its current budget of \$5.126 billion in Year-of-Expenditure (YOE) dollars, including \$797.69 in total contingency (or 19.5%) and \$246.98 million in financing costs. The FFGA Revenue Service Date should be no earlier than January 2020.

7.4 Recommendations

Prior to Entry into Final Design

- (1) The grantee should hold its current budget of \$5.126 billion. This budget should include \$246.98 million in finance costs and \$797.69 million in contingency (allocated and unallocated), or 19.5%.
- (2) The FFGA Revenue Service Date should be no earlier than January 2020.

8.0 PROJECT MANAGEMENT PLAN REVIEW

8.1 Project Management Plan

The PMOC followed the requirements outlined in the *OP 20 – Project Management Plan Review*, dated May 2010, to assess and evaluate the grantee’s Project Management Plan, Revision 4, dated April 2011.

The FTA requires that grantees develop and implement a written Project Management Plan (PMP) for any major capital project funded by FTA. Specifically, Title 49 of the United States Code Section 5327 of Chapter 53, entitled “Project Management Oversight (PMO)” requires a PMP as a condition of Federal financial assistance for major capital projects. The required elements of a PMP are stipulated in the Code of Federal Regulations:

Title 49 – Transportation

Part 633 – Project Management Oversight

Subpart C – Project Management Plans

Section 633.25 – Contents of a Project Management Plan

At a minimum, 49 Code of Federal Regulations (CFR) Part 633 requires that a recipient's PMP include the following items:

- (1) *A description of adequate recipient staff organization, complete with well-defined reporting relationships, statements of functional responsibilities, job descriptions, and job qualifications*
- (2) *A budget covering the project management organization, appropriate consultants, property acquisition, utility relocation, systems demonstration staff, audits, and such miscellaneous costs as the recipient may be prepared to justify*
- (3) *A design management process encompassing Preliminary Engineering and Final Design*
- (4) *A construction schedule*
- (5) *A document control procedure and record-keeping system*
- (6) *A change order procedure that includes a documented, systematic approach to the handling of construction change orders*
- (7) *A description of organizational structures, management skills, and staffing levels required throughout the construction phase*
- (8) *Quality control and quality assurance programs*
- (9) *Material testing policies and procedures*
- (10) *Plan for internal reporting requirements including cost and schedule control procedures*
- (11) *Criteria and procedures to be used for testing the operational system or its major components;*
- (12) *Periodic updates of the Plan*
- (13) *The recipient’s commitment to make monthly submission of project budget and project schedule to the Secretary*

Additional requirements are outlined in Section 633.27 of 49 CFR 633 (Subpart C) regarding the implementation of a project management plan as follows:

- (1) *Upon approval of a project management plan by the Secretary the recipient shall begin implementing the plan.*
- (2) *If a recipient must modify an approved project management plan, the recipient shall submit the proposed changes to the Secretary along with an explanation of the need for the changes.*
- (3) *A recipient shall submit periodic updates of the project management plan to the Secretary that include, but are not limited to, the following:*
 - (a) *Project budget*
 - (b) *Project schedule*
 - (c) *Financing, both capital and operating*
 - (d) *Ridership estimates, including operating plan*
 - (e) *Where applicable, the status of local efforts to enhance ridership when estimates are contingent, in part, upon the success of such efforts*
- (4) *A recipient shall submit current data on a major capital project's budget and schedule to the Secretary on a monthly basis.*

8.1.1 PMOC Assessment

Through review of the grantee's PMP, the PMOC was able to assess the ability of the grantee and its project management approach to take the project successfully from entry to Final Design through award of the Full Funding Grant Agreement (FFGA). In doing so, the PMOC found that the PMP at this phase demonstrates a well conceived plan for project bidding and construction.

The PMOC has reviewed the PMP to ensure adequacy and soundness of the grantee's plans and procedures for:

- NEPA coordination. The PMOC reviewed the grantee's Mitigation Monitoring Program that has been developed for managing and implementing mitigation actions into the design documents, cost estimates and schedules and has no further comments.
- Design control. The grantee has established and is implementing the plans and procedures for design control including reviews for design, value engineering, life-cycle cost considerations, constructability, and safety.
- Project controls. The PMOC reviewed the grantee's baselines for capital cost estimate and schedule. The grantee has accepted the PMOC recommendation of combining all various schedules into one all encompassing schedule file, thus creating a true MPS. The Scheduling Procedures and PMP require revision to address any Schedule Breakdown Structure changes. The grantee's approach and plans for risk identification, assessment, and mitigation, and the development of adequate contingencies are acceptable.
- Project Delivery and Procurement. The PMOC reviewed the grantee's contracting plan for project delivery and procurement and evaluated the soundness and adequacy of the its approach to bidding and awarding of contracts, procurement of materials, equipment and vehicles, and the construction administration and construction management of the Project, and the PMOC has no further comments. The selected project delivery methods and contract packaging strategies are reflected in project schedules and cost estimates.

8.1.2 PMP Sub-Plans

Sub-plan documents are referenced in the PMP but require additional detail and information, which can more easily be recorded and referenced in a stand-alone document. The Table below provides a listing of the sub-plans. The table includes the document revision and status pursuant to PMOC review and comment. Note that the table does not include the numerous Procedures that are also developed and implemented by the grantee to further support the function, integration, and execution of the various plans.

Table 9. PMP Sub-Plans

Sub-Plan	Revision No.	Date	Notes
Quality Management Plan (QMP)	0	01-Jan-11	Acceptable for Final Design
Real Estate Acquisition and Management Plan (RAMP)	4	21-Dec-10	Accepted by FTA on 08-Feb-11
Bus Fleet Management Plan (BFMP)	2	Jun-10	Acceptable for Final Design
Rail Fleet Management Plan (RFMP)	0	06-Apr-11	Acceptable for Final Design
Safety and Security Management Plan (SSMP)	2	01-Jun-11	Acceptable for Final Design
Safety and Security Certification Plan (SSCP)	1	01-Jun-11	Acceptable for Final Design
Configuration Management Plan (CMP)	0	23-Dec-10	Acceptable for Final Design
Staffing Plan	3	11-Mar-11	Acceptable for Final Design
Risk and Contingency Management Plan		27-Sep-11	Acceptable for Final Design
Operating Plan		06-Apr-11	Acceptable for Final Design
Force Account Plan	0	21-Jan-11	Acceptable for Final Design
Mitigation Monitoring Program	0	18-Feb-11	Acceptable for Final Design
Interface Management Plan	0	29-Mar-11	Acceptable for Final Design
Contract Packaging Plan	2	09-Mar-11	Acceptable for Final Design
Claims Avoidance Plan	0	06-Apr-11	Acceptable for Final Design
Construction Management Plan	0	12-Apr-11	Acceptable for Final Design
Contract Resident Engineer Manuals (DB & DBOM)		28-Sep-11	Acceptable for Final Design
Contract Resident Engineer Manuals (DBB)		Pending	Grantee submittal pending
Project Procedures		04-Apr-11	Acceptable for Final Design

8.1.3 Conclusion

While the PMOC has identified PMP revisions that will be necessary prior to the FFGA, it has nevertheless found the PMP to be a generally well-written and thorough document that satisfies the FTA requirements for a project entering the Final Design phase. The PMOC recommends that PMP Revision 4, dated April 2011 be approved as a deliverable for entering Final Design.

8.1.4 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) Update the Staffing Plan and revisions to the organization chart due to the creation of HART, changes in PMC positions and grantee staff, and to adherence

- to the expectation of transitioning of PMC staff to grantee staff during the Final Design and construction phase of the Project.
- (2) Update Figure 6 – Final Design Organization Chart of the PMP to include the Project Labor Agreement (PLA) Officer, Legal Counsel, and General Engineering Consultant (GEC) Safety and Security personnel positions that are currently unfilled.
 - (3) Update Figure 6 – Final Design Organization Chart of the PMP to add positions to the organization chart recommended by the PMOC in OP 21 section of this report.
 - (4) Update the PMP to address the new transit authority in detail since it commenced operations on July 1, 2011.
 - (5) Expand the Construction Management and Testing and Start-Up sections during Final Design, as the requirements and the processes are further defined.
 - (6) Develop the DBB Resident Engineer and Inspection Manual prior to the start of the DBB construction contracts.

8.2 Design Control

8.2.1 Value Engineering

The grantee sponsored Value Engineering (VE) workshops on station design (April 2010) and on the Airport and City Center Guideway Segments (April 2011), which cover virtually the entire portion of the Project that is to be delivered by the traditional DBB method. The Project also benefited from a program of Alternative Technical Concepts (ATCs) that were received from bidders on the project's DB and DBOM contracts. The grantee has accepted or conditionally accepted 79 of 154 such VE and ATC proposals, with an estimated value of up to \$310 million in net savings. Such savings, of course, depend on the actual implementation of the changes and may be affected by the "conditions" in the "conditionally accepted" category and the amount of overlap between similar VE or ATC proposals. PMOC does not expect the savings or the implementation percentage to meet the projected totals, but does feel that the efforts were effective in at least inducing serious study of the project's assumptions.

It is the PMOC's opinion that the grantee has addressed the VE element of the Project in PE and will continue to do so in Final Design.

8.2.2 Coordination Review – Third Party Agreements

The grantee has identified all third party agreements needed for the Project. PMOC has tracked the status of the third-party agreements during the monthly review meetings. The grantee will need to negotiate, finalize, or update agreements with Hawaii Department of Transportation (HDOT), Honolulu International Airport (HNL), the Federal Aviation Administration (FAA), the Department of Hawaiian Homelands (DHHL), United States Navy (USN), and all the various utility companies. While most of these agencies have shown a willingness to cooperate with the grantee, nothing can be guaranteed about the success of these relationships until agreements are in place.

It is the opinion of the PMOC that the grantee has sufficiently managed the numerous third party agreements in a manner acceptable for entry into Final Design.

8.2.3 Constructability Review

The grantee has developed a Contract Packaging Plan. As part of the Risk Assessment, the PMOC reviewed the constructability of the Project and the Contract Packaging Plan.

The design oversight provided by the grantee will be a continuous process throughout the Final Design phase of the various contracts. The grantee will implement frequent design reviews, constructability reviews, peer reviews, and value engineering. The PMOC will continue to monitor these efforts.

The PMOC generally concurs with the grantee's logic in the selection of the proposed contract packaging approach. Each proposed package is well-reasoned from a location, contract size, and work management standpoint. The PMOC is of the opinion that the contract delivery methodology proposed by the grantee can be successfully executed. The grantee has the statutory authority to award the contract types currently under consideration.

It is the opinion of the PMOC that the grantee has sufficiently defined its Design Control process to meet the FTA guidelines in a manner acceptable for entry into Final Design.

8.3 Technical Capacity and Capability

Per FTA Oversight Procedure 21, Grantee Technical Capacity and Capability Review, the PMOC will perform evaluations and render professional opinions regarding both the grantee's Technical Capacity and Capability (TCC) to successfully implement, manage, and complete a major Federal-assisted capital project and the grantee's ability to recognize and manage project risk factors and implement mitigation measures. The evaluations cover the following:

- Organization, Personnel Qualifications and Experience
- Grantee's approach to the work, ability to perform the work, including its methods, policies, and procedures for developing and updating reasonable and realistic project cost estimates and schedules, and the grantee's abilities to identify, analyze, manage and mitigate project risks.

8.3.1 PMOC Assessment

The PMOC has some concern that the grantee may continue experiencing difficulty attracting and retaining the experienced staff needed for long-term Project assignment and permanent grantee employment (post-Project) given Hawaii's geographic isolation, salary limits, and high cost of living relative to the mainland. The grantee should adhere to the staffing plan to address the transition of staff during the Final Design and construction phases for positions currently occupied by PMC staff to grantee staff.

The grantee must strive to transition the key management positions currently occupied by the PMC as early as possible. The grantee should focus on transitioning the key positions of Chief Project Officer, Project Controls Manager, and Contracts Administrator, in order for the grantee to have more ownership and maintain stronger continuing control of the project without having to rely too heavily on the PMC.

The PMOC will continue monitoring the grantee's project management process to ensure that it is effectively managing the Project and continuing fiscal responsibility and accountability for all decisions affecting project design, cost, and schedule, until all key management positions transition to full-time grantee staff. The transition from PMC staff to full-time grantee staff will be closely monitored by the PMOC throughout the Final Design phase of the project.

8.3.2 Conclusion

It is the PMOC's professional opinion that the grantee has demonstrated its Technical Capacity and Capability to execute the project during the Preliminary Engineering phase and its readiness to enter the Final Design phase.

8.3.3 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) The grantee should provide direct support to the Executive Director through a Deputy (or a combination of executive managers). This recommendation should be addressed following identification of a permanent Executive Director.
- (2) The grantee should develop a succession plan for those key management positions that may be considered short term (three years or less) in order to ensure a successful "knowledge transfer" of project consultants' expertise to the grantee. The Succession Plan can be developed during the Final Design phase but before FFGA application preparation and should be directly associated with the grantees staffing plan.
- (3) The PMP, companion documents, and Project Control procedure documents must use consistent and traceable vernacular such as correct position titles, deliverable document titles, procedure titles, etc. These changes can be made in subsequent document revisions during the Final Design phase but prior to FFGA application activities.
- (4) The grantee should hire a recruiting consultant to assist with staffing plan, recruiting, training, transition planning and execution, and employee retention.
- (5) The grantee should develop a Project Responsibility Assignment Matrix (RAM) similar to Figure 7 in the PMP in order to better document and clarify the roles and responsibilities, functions, and interface required among the blended organization of city department, city Project, and consultant staff.
- (6) The grantee should hire a real estate acquisition consultant to meet peak resource demands and provide expert consultant advice as needed.
- (7) The grantee should ensure that a separate and distinct group within the GEC is utilized to perform the reviews for building code and ADA compliance to streamline the permit process.

The following table summarizes the PMOC findings and recommendations with regard to staffing requirements for the Project.

Table 10. Staffing Requirements

Position	Grantee or Consultant	Date Required
Deputy Executive Director	Grantee	After permanent Exec. Director is identified
Deputy Director of Finance	Grantee	After permanent Exec. Director is identified
Claims Avoidance and Dispute Resolution (claims) Specialist	Grantee or Consultant	Prior to start of construction
Project Labor Agreement Officer (key management)	Grantee	Prior to start of construction
Contract Officer (key management for Procurement/Contract Officer)	Grantee	Prior to start of construction
Design Build Contract Administrator (support staff for Procurement/Contract Officer)	Grantee or Consultant	Prior to start of construction
Design Contract Administrator (support staff for Procurement/Contract Officer)	Grantee or Consultant	Prior to start of construction
Procurement/Contract Assistant (support staff for Procurement/Contract Officer)	Grantee or Consultant	Prior to start of construction
Senior Clerk (support staff for Administration Services Officer)	Grantee or Consultant	Prior to start of construction
CMS Programmer/Data Administrator (support staff for Senior Project Controls Analyst)	Grantee or Consultant	Prior to start of construction
Senior Scheduler (support staff for Senior Scheduling Manager)	Grantee or Consultant	Prior to start of construction

8.4 QA/QC Plan Review

The FTA requires a grantee undertaking a major capital program to prepare a PMP that includes a Quality Assurance/Quality Control (QA/QC) Plan. The development of a project QA/QC Plan should be an outgrowth of a functioning quality management system. A comprehensive quality management system is comprised of a written quality policy, a written plan, written procedures, a management that supports and takes responsibility for quality, and personnel who will undertake quality assurance and quality control activities. The required elements of a QA/QC Plan are stipulated in FTA-IT-90-5001-02, *Quality Assurance and Quality Control Guidelines*, dated February 2002.

The PMOC followed the requirements outlined in the *OP 24 – QA/QC Review*, dated May 2010, to assess and evaluate the grantee's Quality Management Plan (QMP), Revision 0, dated January 11, 2011. The objective of this review was to assess and evaluate the adequacy and soundness of the grantee's QA/QC program and the grantee's implementation of such program over the course of the Project.

8.4.1 PMOC Assessment

The PMOC assessed and evaluated the adequacy and soundness of the grantee's QA/QC program and the implementation of the program. The PMOC determined that each of the following OP 24 categories was satisfactorily addressed:

- Quality Management

- Document Control
- Design Control
- Procurement
- Construction/Inspection
- Operations, Startup, and Testing

8.4.2 Conclusion

The PMOC recommends that QMP Revision 0, dated January 11, 2011, be accepted as a deliverable for entering Final Design.

8.4.3 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) Clarification should be added to the QMP regarding the utilization and maintenance of the “Review Comments Log” and the “Change Management Log” with respect to tracking design changes.
- (2) The “Project Wide Document Control Procedure” should reference and apply to all documents for the Project, not just those documents required in the QMP.
- (3) The QMP should define the process by which the Deputy Chief Project Officer of Engineering and Construction (DEC) will verify that the identification and control of materials, parts, and components are performed during design, construction, and testing.
- (4) The grantee should add requirements to the QMP regarding products and materials that will be turned over to the owner at the conclusion of the project.

8.5 Safety and Security Management Plan

The Federal Transit Administration (FTA) requires a grantee undertaking a major capital program to prepare a PMP that includes a Safety and Security Management Plan (SSMP). The grantee developed an SSMP according to the most recently available FTA guidance, *Safety and Security Management Guidance for Major Capital Projects*, FTA C 5800.1, dated August 1, 2007.

The PMOC followed the requirements outlined in the *OP 22 – Safety and Security Management Plan Review*, dated May 2010, to assess and evaluate the grantee’s SSMP, Revision 2.0, dated June 1, 2011.

8.5.1 PMOC Assessment

The PMOC assessed the SSMP using criteria identified in Items 1 through 12 in OP 22, which are also listed in Circular 5800.1, Pages II-4 and II-5, and against the specific section-by-section requirements identified in C5800.1 Chapter IV.

The PMOC review found that SSMP Revision 2.0, dated June 1, 2011, contains all sections specified in FTA Circular 5800.1, with the minimum content required for Final Design entry either included or implied. The PMOC review also found, however, a need for revision in some plan sections and appendices for both minor (correction of typographical errors and omissions) and major reasons. One such major concern is whether the staffing plan provides sufficient safety and security technical capacity to cover all activities likely during Final Design, during which phase the Design-Build contractors are likely to begin construction, albeit limited, under Letters of No Prejudice. As a result of its findings, the PMOC has reached the following conclusions:

- The content of all plan sections and support appendices of the SSMP is at least marginally compliant with requirements for the Final Design entry stage of the Project.
- The content of certain sections of the SSMP needs revision to better clarify intent, correct typographical errors or omissions, and to address specific issues identified in the PMOC OP 22 deliverable comments.
- Revision must be made to SSMP Section 2.4 and Appendix A prior to submission of an FFGA application.

8.5.2 State Oversight Agency (SOA)

- HDOT submitted a draft SOA roadmap to the PMOC in September 2011. In the Draft SOA roadmap, HDOT established a recruiting period to hire a State Oversight Agency (SOA) Project Manager for the Project. HDOT's schedule of hiring this person by July 2012 is unacceptable. It is the PMOC's professional opinion that HDOT needs to accelerate the hiring process and select a qualified SOA Project Manager by February 2012.
- A draft Memorandum of Agreement (MOA) was submitted to the PMOC in April 2011 and covers funding of the SOA by HART until operations begin. The grantee and HDOT have not executed the MOA to date. It is the PMOC's professional opinion that HDOT and HART need to execute the MOA no later than first quarter of CY 2012.
- HART provided the PMOC with a draft scope of work in October 2011 for HDOT to procure a State Oversight Agency (SOA) Consultant to provide technical assistance in implementation of Title 49 Code of Federal Regulations (49 C.F.R) Part 659 Rail Fixed Guideway Systems; State Safety Oversight; Final rule on behalf of HDOT. The consultant should be selected no later than February 2012.

8.5.3 Conclusion

The PMOC recommends that SSMP Revision 2.0, dated June 1, 2011, be accepted as a deliverable for entering Final Design.

8.5.4 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) The grantee should make revisions to the Safety and Security Management Plan (SSMP) as identified in the OP 22 deliverable.
- (2) The grantee should address the organizational, staffing, and technical capacity issues raised by comments in the OP 22 deliverable.
- (3) HDOT should accelerate the hiring process and select a qualified SOA Project Manager by February 2012.
- (4) HDOT and HART should execute a Memorandum of Agreement (MOA) no later than the first quarter of CY 2012.
- (5) HDOT should select an SOA consultant no later than February 2012.

8.6 Real Estate Acquisition and Management Plan (RAMP)

The PMOC followed the requirements outlined in the *OP 23 – Real Estate Acquisition and Management Plan Review*, dated May 2010, to assess and evaluate the grantee's RAMP, Revision 4, dated January 2011. The review process consisted of identifying references for assessment of the plan contents and performing a review as needed to validate claims made by the grantee in the RAMP. Following are the objectives of the OP 23 review:

- Evaluation and continuous oversight of the Grantee's RAMP, including real estate acquisition, project scope, estimated cost, overall schedule and critical path, and the relocation plan
- Evaluation of the real estate schedule for completeness, adequacy, consistency, appropriateness of level of detail given the phase, identification of risks inherent in the schedule, and evaluation of the impact of these on project scope and cost
- Characterization of the grantee's ability to meet the requirements of Federal laws, regulations, and guidance when acquiring real estate
- Determination of the grantee's compliance with all governing requirements during the implementation phase of the real estate acquisition program
- Based on observations of the project, timely reporting by the PMOC of recommended improvements, lessons learned, and best practices

8.6.1 PMOC Assessment

Each of the following elements of the RAMP was reviewed per the requirements of OP 23 and found to be adequately addressed:

- Organizational Structure
- Document Control
- Property Management Plan
- Acquisition Plan
- Ownership and title information
- Appraisal
- Establishment of Offer of Just Compensation
- Negotiations
- Closing/Escrow
- Condemnation
- Disposition Plan

- Relocation Assistance Plan
- Staffing and Administration
- Appeals
- Third Party Real Estate Agreements
- Real Estate Cost Estimate
- Acquisition and Relocation Schedule

8.6.2 Conclusion

The RAMP was accepted by the FTA on February 8, 2011 for entry into Final Design.

8.6.3 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) The grantee should ensure that all real estate acquisition and relocation activities comply with the Record of Decision requirements.
- (2) The RAMP should be updated to reflect organizational structure and policy changes associated with the new transit authority, HART, which went into effect on July 1, 2011.

8.7 Bus Fleet Management Plan

The PMOC followed the requirements outlined in the *OP 37 – Fleet Management Plan Review*, dated May 2010, to assess and evaluate the grantee’s Bus Fleet Management Plan (BFMP), Revision 2, dated December, 2010.

8.7.1 PMOC Assessment

The PMOC’s review process consisted of identifying references for assessment of the plan contents and performing an as-needed analysis to validate calculations and claims made by grantee in the BFMP. Review of this document concentrated on the impacts and grantee plans for bus service that result from the Project.

The BFMP presented empirical data for operations of the current system through 2009 and provided projections through 2020. The BFMP satisfactorily addressed vehicles and service types in operation and anticipated to be in operation, as well as factors that are relevant to grantee’s determinations of current and future equipment needs. The plan addressed the composition of the fleet, operating conditions, and facilities.

The PMOC findings include:

- Grantee has met the intent of the requirement for a BFMP and has demonstrated its ability to properly plan for and carry out the overall management of its bus fleet.

- The BFMP addresses operating policies (level of service requirements), peak vehicle requirements (PVR), inspection and maintenance programs, system and service expansions, vehicle procurements and related schedules, and operating spare ratio (OSR) justification.

8.7.2 Conclusion

The PMOC recommends that the grantee's BFMP, Revision 2, dated December 2010, be accepted as a deliverable for entering Final Design.

8.7.3 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

None

8.8 Rail Fleet Management Plan

The PMOC followed the requirements outlined in the *OP 37 – Fleet Management Plan Review*, dated May 2010, to assess and evaluate the grantee's Rail Fleet Management Plan (RFMP), Draft dated April 2011 (with "red-lined" version submitted on July 13, 2011).

8.8.1 PMOC Assessment

The PMOC reviewed the July 13, 2011 red-lined RFMP to assess compliance with appropriate FTA Guidance and found that the document generally follows FTA's 8-step process for operating spare ratio computation. The previous April 2011 revision contained several key topics in the RFMP with limited detail or cursory information that did not fully address guidance provided in FTA reference documents; subsequent to that submission and following the June 3, 2011 PMOC report, conference calls were held with grantee personnel to resolve deficiencies. The PMOC has reviewed the red-lined document accordingly and has noted those items that have been resolved or that the grantee has agreed to update in the next revision of the RFMP.

Through the CSC, the grantee is procuring 80 new "light metro" rail vehicles (identified as "Heavy Rail" in the SCC workbook) to provide service through 2024. The O&M portion of the CSC defines activities related to service operations and planned management and maintenance of the fleet, and also provides substantial information regarding service demand. Additional detail should be provided in the next update of the RFMP. Additional details on several other topics will be needed as well, such as for service demand and operations, utilization of revenue vehicles, anticipated vehicle maintenance and availability, and fleet management.

8.8.2 Conclusion

The PMOC recommends that the grantee's Draft RFMP, dated April 2011 (with "red-lined" version submitted on July 13, 2011), be accepted as a deliverable for entering Final Design.

8.8.3 Recommendations

Prior to Entry into Final Design

None

After Entry into Final Design

- (1) The grantee should make revisions to the Rail Fleet Management Plan (RFMP) as identified in the OP 37 deliverable:
 - Service operations and vehicle demand forecasting
 - Planned fleet Maintenance practices and management staffing that will be provided through CSC
 - Planned use of Maintenance Statistics and Maintenance Strategy as provided through the CSC
 - MSF functionality and vehicle availability

9.0 CONCLUSION

The PMOC has determined that the grantee has demonstrated the Technical Capacity and Capability to effectively and efficiently proceed into the Final Design phase, once all deliverables are submitted and accepted as mentioned above. The PMOC has also identified several Technical Capacity and Capability issues that must be addressed during Final Design, a condition which is inherent with a mega-program and blended organization. These challenges will continue and will require close attention by the grantee and close monitoring by the PMOC during the Final Design phase.

The PMOC recommends that the FTA provide approval for the City and County of Honolulu to proceed with Final Design for the Honolulu High-Capacity Corridor Project. The Project budget should be \$5.126 billion in YOE, including \$797.69 in total contingency (or 19.5%) and \$246.98 million in financing costs. The FFGA Revenue Service Date should be no earlier than January 2020.

It should be noted that the recommended budget is based on the limited data regarding the Cost Reduction Measures that were provided by the grantee. These cost reduction measure values must be validated after more detailed supporting documentation is developed early in Final Design.

10.0 APPENDICES

Appendix A: List of Acronyms

AA	▪ Alternatives Analysis
AACE	▪ Association for the Advancement of Cost Engineering
AC	▪ Alternating Current
AHJV	▪ Ansaldo Honolulu Joint Venture
ATC	▪ Alternative Technical Concept
ATC	▪ Automated Train Control
ATO	▪ Automatic Train Operation
BAFO	▪ Best and Final Offers
BCE	▪ Base Cost Estimate
BFMP	▪ Bus Fleet Management Plan
CCTV	▪ Closed Circuit Television
CDC	▪ Compendium of Design Criteria
CE&I	▪ Construction Engineering and Inspection
CFR	▪ Code of Federal Regulations
CMP	▪ Configuration Management Plan
CMS	▪ Document Control System
CMS	▪ Oracle's Primavera Contract Manager Software
CPO	▪ Chief Project Officer
CPS	▪ Construction Project Schedule
CSC	▪ Core Systems Contract
DB	▪ Design-Build
DBB	▪ Design-Bid-Build
DBOM	▪ Design-Build-Operate-Maintain
DC	▪ Direct Current
DEC	▪ Deputy Chief Project Officer of Engineering and Construction
DEIS	▪ Draft Environmental Impact Statement
DHHL	▪ Department of Hawaiian Homelands
DPP	▪ Department of Planning and Permitting
DTS	▪ Department of Transportation Services
EDC	▪ Engineering Design Consultant
EIS	▪ Environmental Impact Statement
FAA	▪ Federal Aviation Administration
FD	▪ Final Design
FEIS	▪ Final Environmental Impact Statement
FF	▪ Finish-Finish
FFGA	▪ Full Funding Grant Agreement
FONSI	▪ Finding of No Significant Impact
FS	▪ Finish-Start
FTA	▪ Federal Transit Administration
GEC	▪ General Engineering Consultant
GPRM	▪ Grace Pacific Rocky Mountain
HART	▪ Honolulu Authority for Rapid Transportation
HDOT	▪ Hawaii Department of Transportation
HHCTCP	▪ Honolulu High Capacity Transit Corridor Project
HNL	▪ Honolulu International Airport
IGA	▪ Intergovernmental Agreement
LONP	▪ Letter of No Prejudice
LPA	▪ Locally Preferred Alternative
MOS	▪ Minimum Operating Segment
MOT	▪ Maintenance of Traffic
mph	▪ Miles Per Hour

MPS	▪ Master Project Schedule
MSF	▪ Maintenance and Storage Facility
MW	▪ Megawatt
N/A	▪ Not Applicable
NEPA	▪ National Environmental Policy Act
NTP	▪ Notice to Proceed
OBS	▪ Organizational Breakdown Structure
OCC	▪ Operations Control Center
OP	▪ Oversight Procedure
PA	▪ Programmatic Agreement
PE	▪ Preliminary Engineering
PMC	▪ Project Management Consultant
PMOC	▪ Project Management Oversight Contractor
PMP	▪ Project Management Plan
QA/QC	▪ Quality Assurance/Quality Control
QMP	▪ Quality Management Plan
RAMP	▪ Real Estate Acquisition and Management Plan
RAP	▪ Rail Activation Plan
RCMP	▪ Risk and Contingency Management Plan
RFMP	▪ Rail Fleet Management Plan
RFP	▪ Request for Proposals
ROD	▪ Record of Decision
ROW	▪ Right-of-Way
RSD	▪ Revenue Service Date
RTD	▪ Rapid Transit Division
SBS	▪ Schedule Breakdown Structure
SCC	▪ Standard Cost Category
SF	▪ Start-Finish
SITP	▪ System Integration Test Plan
SS	▪ Start-Start
SSCP	▪ Safety and Security Certification Plan
SSMP	▪ Safety and Security Management Plan
TCC	▪ Technical Capacity and Capability
TPM	▪ Office of Program Management
UH	▪ University of Hawaii
US	▪ United States of America
USC	▪ United States Code
USN	▪ United States Navy
VE	▪ Value Engineering
WBS	▪ Work Breakdown Structure
WOFH	▪ West Oahu/Farrington Highway
YOE	▪ Year of Expenditure

Appendix B: Documents Reviewed

Document	Rev. No.	Date
Final Environmental Impact Statement	-	25-Jun-10
Programmatic Agreement	-	18-Jan-11
Record of Decision	-	18-Jan-11
Project Management Plan	4	01-Apr-11
Quality Management Plan (QMP)	0	06-Jan-11
Real Estate Acquisition and Management Plan (RAMP)	4	01-Feb-11
Bus Fleet Management Plan (BFMP)	2	09-Jun-10
Rail Fleet Management Plan (RFMP)	0	08-Jul-11
Risk and Contingency Management Plan (RCMP)	F	19-Aug-11
Safety and Security Management Plan (SSMP)	2	01-Jun-11
Safety and Security Certification Plan (SSCP)	1	01-Jun-11
Configuration Management Plan (CMP)	0	05-Jan-11
Staffing Plan	3	11-Mar-11
Operating Plan		06-Apr-11
Force Account Plan	0	May-11
Mitigation Monitoring Program	0	18-Feb-11
Interface Management Plan	0	29-Mar-11
Contract Packaging Plan	2	09-Mar-11
Claims Avoidance Plan	0	06-Apr-11
Construction Management Plan	0	12-Apr-11
1.PP-02 – Procedure Development Process	0	16-Mar-11
1.PP-03 – Standard Terms, definitions, and Acronyms	0	26-May-11
1.PP-04– Baseline Documents Revision and Control	0	12-Jan-11
2.PA-01 – Security Sensitive Information (SSI)	0	26-May-11
2.PA-02 – Procurement Control	0	19-May-11
2.PA-03 – Email Management	0	05-May-11
2.PA- 04- Project Wide Document Control	0	26-May-11
2.PA-05 – Project Library	0	05-May-11
2.PA-06 – Community Relations and Media Contacts	0	16-Mar-11
2.PA-07 – RTD Training Procedure	0	26-May-11
3.PM-01 – Contract Management System	0	16-Mar-11
3.PM-04 – Public Information Communication	0	16-Mar-11
3.PM-05 Meeting/Minutes	0	16-Mar-11
4.PC-03 – Project Progress Reports	0	16-Mar-11
4.PC-04 – Program Scheduling	0	10-Jan-11
4.PC-05 – Project Accounting	0	26-May-11
4.PC-06 – Cost Estimating	0	05-May-11
4.PC-07 – Cost Control	0	05-May-11
4.PC-08 – Risk Management	0	26-May-11
4.PC-09 – Contingency Management	0	16-Mar-11
5.CA-01 – Contract Administration	0	26-May-11
5.CA-02 – Contract Change Management	0	16-Mar-11
5.CA-03 – Contractor Progress Payments	0	16-Mar-11
5.CA-04 – Contractor Progress Reports	0	08-Apr-11
5.CA-05 – Contract Change Orders	0	16-Mar-11
5.CA-06 – Contract Closeout	0	16-Mar-11
5.CA-07 – Claims and Disputes Resolution	0	05-May-11
6.CM-01 – Submittal Procedure	0	05-May-11
6.CM-02 – RFI Procedure	0	18-Apr-11

Document	Rev. No.	Date
6.CM-03 – RFC Procedure	0	16-Mar-11
6.CM-05 – Interface Management and Coordination Procedure	0	26-May-11
1992 Honolulu Rapid Transit Development Project System Procurement Contract & Methodology [1992 Original Estimate]		30-Aug-91
Basis of Capital Cost Escalation Rates		17-Sep-08
Basis of Current Airport DEIS Estimate		12-May-09
Basis of Schedule.doc		20-Sep-08
Bus Fleet Management Plan (BFMP), Revision 0		4-Apr-08
Capital Cost Breakdown with GET 09-Jun-09.xls		9-Jun-09
Constr Sched Assumption Notes.pdf		28-Aug-08
Construction Workshop Frequently Asked Questions (FAQ)		12-Jun-08
Construction Workshop Presentation		12-Jun-08
CPM Schedule (CITY.pdf)		20-Sep-08
Current Geotechnical Investigation Program boring logs and boring location map		
DEIS-FEIS Audit Trail		4-Jun-09
DRAFT Contract Packaging Plan, Revision 2		5-Feb-09
DRAFT Design Criteria		
Chapter 1 – General		23-Feb-09
Chapter 2 – Operations		3-Feb-09
Chapter 3 – Environmental		23-Feb-09
Chapter 4 – Track Alignment and Vehicle Clearances		Jan-09
Chapter 5 – Trackwork		15-Dec-08
Chapter 6 – Civil		Jan-09
Chapter 7 – Traffic		Jan-09
Chapter 8 – Utilities		Mar-09
Chapter 9 – Structural		22-May-09
Chapter 10 – Architecture		20-Oct-08
Chapter 11 – Landscape Architecture		18-Sep-08
Chapter 12 – Revenue Vehicle		Mar-09
Chapter 13 – Traction Electrification		17-Feb-09
Chapter 17 – Corrosion Control		15-Dec-08
Chapter 19 – Facility Mechanical		Jan-09
Chapter 20 – Facilities Electrical		Jan-09
Chapter 22 – Elevators and Escalators		
Chapter 23 – Fire Life Safety		2-Feb-09
Chapter 26 – Sustainability		Mar-06
Draft Environmental Impact Statement (DEIS) Honolulu High-Capacity Transit Corridor Project		30-Oct-08
DRAFT HHCTCP Cost Escalation Forecast Report FY 2009-2019		Mar-09
EIS Appendix A Plan and Profile March 2009.pdf		Mar-09
Escalation Build-up.xls		10-Jun-09
FEIS Conceptual Alignment Plan and Profile		Mar-09
Final Capital Costing Memorandum [October 2006 Memo]		23-Oct-06
Final Evaluation of Project Delivery Options		2-Nov-06
Financial Plan For Entry Into Preliminary Engineering Submittal		1-May-09
Fixed Guideway Fleet Sizing Report		Jun-09
General Conditions Of Construction Contracts		Jul-99
General Excise and Use Tax in Hawaii		16-Feb-06
Geotechnical and Geological Reconnaissance, Honolulu Rapid Transit System,		31-Aug-91

Document	Rev. No.	Date
Ewa and Honolulu, Hawaii		
Geotechnical Engineering Exploration, North-South Road, Phase 1B, F.A.I. Project No. STP-8930(2), Ewa, Hawaii		8-Feb-07
GET Forecast FY 2009-2023 Memo (Update)		27-Mar-09
Guideway Superstructure Study – Summary Report		22-May-08
HHCTC Project Basis of Capital Cost Escalation Rates		17-Sep-08
HHCTC Project Letter on cost of Leeward Community College Underground station		19-Sep-08
HHCTCP Post Alternative Analysis Estimate Methodology		26-Aug-08
Quality Management Plan, Revision 1		8-May-09
Honolulu High-Capacity Transit Corridor Project, Steel Wheel Technology - Evaluation of Vehicle Types		12-Jun-08
Honolulu Linear Schedule		Jun-09
Honolulu Linear Schedule 01 jun 09.pdf		1-Jun-09
Honolulu Rapid Transit Development Project; System Design, Supply, Construction, and Operation & Maintenance; Geotechnical Engineering Exploration		Mar-91
Honolulu Rapid Transit Program; Hotel Street Subway Design, Supply, and Construction; Geotechnical Basis for Proposal		Jul-91
Honolulu Rapid Transit Program; Hotel Street Subway Design, Supply, and Construction; Geotechnical Engineering Exploration		Jul-91
Honolulu Rapid Transit Program; Task 17.01– 40, Preliminary Geotechnical Exploration Report, King Street Subway Alignment Study		Mar-92
MA5A.PRX		
Master Program Schedule MA5E.pdf		10-May-09
Master Project Schedule Basis of Schedule		26-Mar-09
Model Assumptions, ProjectSolve\Technical\Alignment Information		11-Sep-08
Modified AA Estimate (assembly & parametric summary), filename “Baseline 30 w T2.xls” [2008 SCC Support Spreadsheet]		19-Aug-08
MU Airport Alignment 3-27-09.xls		27-Mar-09
PB Cost Estimate and Estimating Methodology [2006 Parametric Estimate]		30-Jun-06
Procurement Methods / Project Delivery / Schedule Presentation		9-Sep-08
Project Management Plan, Revision 2		1-Mar-09
Project Orientation Presentation		9-Sep-08
Proposed Construction Schedule, “HHCTP As of August 25.xer”		25-Aug-08
Rapid Transit Division Standard And Directive Drawings		3-Apr-09
Real Estate Acquisition Management Plan, Revision 2		14-Apr-09
Revised Construction Schedule w Assumptions.pdf		28-Aug-08
RFP-DTS-0900015 – West Oahu/Farrington Highway Guideway Design-Build Contract and Addenda 1-6		4-Feb-09
RFP-DTS-198413 - Core Systems Design-Build-Operate-Maintain Contract and Addenda 1-5		9-Apr-09
RFP-DTS-213102 – Maintenance and Storage Facility Design-Build Contract and Addenda 1		29-May-09
Safety and Security Management Plan (SSMP), Rev 0		11-Mar-08
SCC New Starts Estimate for Airport Alternative [2009 SCC Estimate]		9-Jun-09
SCC New Starts Estimate for Salt Lake Alternative [2008 SCC Estimate]		3-Sep-08
SCC vs Time 3-27-09 rev.xls		27-Mar-09

Document	Rev. No.	Date
Schedule Progress Submittal 7.pdf		2-Sep-08
Structures Workshop Summary Report		7-10-Jan-08
<i>Subsurface Geology of Waikiki, Moiliili and Kakaako With Engineering Application</i> , Masters Thesis submitted to the University of Hawaii		Aug-76
Systems Workshop Presentation		22-Aug-08
Takeoff Audit Report/HHCT/Modified AA Estimate (assembly examples)		9-Sep-08
Technical Memorandum on Utility Relocations [2007 MK Utility Estimate]		14-May-07
Transportation Technical Report		1-Aug-08
West Oahu/Farrington Highway Guideway Design-Build Contract Structural Plan and Profile Drawings		24-Mar-09
Kamehameha Highway Guideway RFP Drawings, Volumes 1-3	Con- formed	Sep-10
Airport Preliminary Engineering Drawings, Volumes 1-3		1-Oct-10
City Center Preliminary Engineering Drawings, Volumes 1-4		6-Oct-10
Value Engineering – Stations Report		Sep-10
Value Enhancement Summary Report		Sep-10
Geotechnical Data Report (WOFH)		27-Mar-09
Supplement to Geotechnical Data Report (WOFH)		15-May-09
Geotechnical Baseline Report (WOFH)	2.0	Aug-09
General Conditions of Design-Build Contracts, Honolulu		Feb-09
WOFH Standard Specifications, Conformed Set		5-Aug-09
WOFH Special Provisions (RFP Addendum No. 23)		19-Oct-09
KH Segment Geotechnical Baseline Report	1.1	07-May-10
KH Geotechnical Data Report		16-Feb-10
KH Geotechnical Data Report Addendum		7-May-10
Airport Geotechnical Data Report		8-Feb-10
Airport Fixed-Guideway Foundation Technical Memorandum		6-Feb-10
City Center Fixed-Guideway Foundation Technical Memorandum		26-Feb-10
City Center Geotechnical Data Report		26-Feb-10
Environment Condition of Property, NAVFAC (Navy Drum Site)		Mar-09
Core Systems DBOM TP-9: Design Criteria		Oct-10
CSC RFP & Addenda		9-Feb-11
AHJV 2 nd BAFO Proposal		24-Feb-11
Before and After Milestone 1 Report		Nov-09
East Kapolei Station PE Drawings		25-Sep-09
UH West Oahu Station PE Drawings		25-Sep-09
Ho’opili Station PE Drawings		25-Sep-09
West Loch Station PE Drawings		18-Sep-09
Waipahu Transit Center Station PE Drawings		18-Sep-09
Leeward Community College Station PE Drawings		18-Sep-09
Pearl Highlands Station & Parking Structure PE Drawings		11-Sep-09
Pearlridge Station PE Drawings		18-Dec-09
Aloha Stadium Station PE Drawings		18-Dec-09
Pearl Harbor Naval Base Station PE Drawings		15-Jan-10
Honolulu International Airport Station PE Drawings		15-Jan-10
Lagoon Drive Station PE Drawings		
Middle Street Transit Center Station PE Drawings		13-Nov-09
Kalihi Station PE Drawings		13-Nov-09
Kapalama Station PE Drawings		13-Nov-09
Iwilei Station PE Drawings		25-Nov-09
Chinatown Station PE Drawings		25-Nov-09

Document	Rev. No.	Date
Downtown Station PE Drawings		25-Nov-09
Civic Center Station PE Drawings		20-Nov-09
Kaka'ako Station PE Drawings		20-Nov-09
Ala Moana Center Station PE Drawings		8-Jan-10
Master Project Schedule (MPS)		9-Jul-11
ROW Schedule		9-Jul-11
Basis of Schedule		2-Jul-11
Various Schedule support files (*.xls, *. xer, *.pdf)		Various
PE Cost Estimate 2010 10-21.pdf		21-Nov-10
PE Cost Estimate & Basis of Estimate 2010 12-21.pdf		21-Dec-10
PE Cost Estimate & Basis of Estimate 2011 03-18.pdf		25-Mar-10
PE Cost Estimate –SCC Summary + escalation 47 separate Excel Files (Summary Sheets for Contracts)		25-Mar-10
Honolulu Rail Transit Project SCC Workbook Oct 2011.xls		02-Nov-11
PE Cost Estimate – Timberline Files		28-Mar-11
Identification of Latent Contingency_15April2011.pdf (includes other adjustment details for ROW, NTPs etc)		15-Apr-11
PE Cost Estimate – Station quantity takeoffs		10-Dec-10
Basis of Escalation formatted and combined.doc		25-Mar-10
Hnl Escalation June 2010 Final.pdf (White Paper)		Jun-10
Programmatic Agreement PA Jan 4 2011.pdf		5-Jan-11
HHCTP Internal Risk Assessment (handout & file)		10-Jan-11
HHCTP Internal Risk Assessment (revised)		21-Apr-11
Revised PE Estimate Final 12-9-10 Breakout GET+Alloc Cont.xls		25-Feb-11
HHCTP RE Revised Utilities_RHH 04-22-10.pdf		25-Feb-10
MOT PE Estimate.pdf		25-Feb-10
MPS_Spread.accdb (MS Access Database)		14-Apr-11
FTA B A Study Plan – Spring 2011 Update.pdf		21-Apr-11
Draft Before& After Study Plan.pdf		21-Apr-11
Contract Packaging Plan Revision 2 – 2.24.2011.pdf		24-Feb-11
Before& After Study Plan Milestone 1 Report.pdf		21-Apr-11
Price Proposals (post bid) Kiewit WOFH		11-Nov-09
Price Proposals (post bid) Kiewit MSF		16-Mar-11
Price Proposals (post bid) Kiewit Kamehameha		16-Mar-11
Price Proposals (post bid) Ansaldo Core Systems		16-Mar-11
Ansaldo explanation of FFGA calculated amount.xls		14-Apr-11

Appendix C: PE Approval Letter Requirements

No.	Item	Completion Date	Comments
Project Scope, Design and Development			
1	Identify any third party agreements necessary for project completion, including utility agreements with private and public owners and military	Jan-10	Complete
2	Resolve the specific regarding proximity of the guideway to runways 22R/4L and 22L/4R at the Honolulu International Airport with HDOT and FAA	May-10	Complete
3	Fully develop vehicle basis of design and functional sizing	Jun-11	Complete
4	Determine rail fleet size requirement	Jun-11	Complete
5	Fully develop scope for the administration building and operations control center	Jun-11	Complete – will be refined by MSF contractor
6	Determine the final location of the maintenance and storage facility		Execution of the License Agreement with DHHL is pending
7	Finalize a contracting packaging plan which includes a source selection plan(s) and contract specific work plans	Mar-11	Complete
8	Develop strategies to streamline the City's process to award contracts and to enter into grant agreements, especially as applicable to FTA grants	Jul-11	Complete – will be addressed further by HART Board
9	Develop a preliminary operation plan	08-Feb-10	Complete
10	Ensure the service velocity does not erode over the next course of design changes	Jun-11	Complete
Project Schedule			
11	Provide a baseline of the master Project Schedule (MPS) early in PE which will be used for monthly progress updates and tracking schedule variances	9-Jul-11	Complete
12	Address the utilization manpower and equipment resource loading and budget and cost loading	9-Jul-11	Complete
13	Include critical activities in the MPS: utility activities, real estate acquisitions, system integration, starting and testing, operational commissioning and training, vehicle procurement, major construction material procurement, FTA review and comment, detail activities for early construction packages	9-Jul-11	Complete
14	Develop a right-of-way schedule	9-Jul-11	Complete
15	Modify the Work Breakdown Structure to cross over with the project budget and cost breakdown structure	21-Dec-09	Complete

No.	Item	Completion Date	Comments
Project Cost			
16	Develop a detailed bottoms-up-style project cost estimate to Standard Cost Category format. The estimate should be detailed sufficiently to determine distributions of materials, labor, equipment and general conditions elements at a minimum. The soft cost estimates should be based on staffing plans, force account plans, contracts and so forth rather than solely on percentages. The estimate should eliminate parametric-style values, cost estimating relationships, and lump sums as much as possible during PE	15-Apr-11	Complete
17	Escalate the cost estimate in accordance with the MPS	15-Apr-11	Complete
18	Provide justification and backup documents to support the quantification and assumptions for the "soft costs" and related general conditions of the project	15-Apr-11	Complete
Technical Capacity			
19	Configuration management and change control mechanism	Jan-11	Complete
20	Develop detailed staffing plans for all remaining phases of the project to ensure adequate technical capacity. The plans should include the dates by which the City will fill each key position. All key City management positions should be filled during PE.	May-11	Complete – City to develop Succession Plan (not required for FD approval)
21	Work with the State of Hawaii to establish a State Safety Oversight Agency office to oversee the project	6-Apr-10	Complete
22	Submit a fully developed Rail Fleet Management Plan	8-Jul-11	Complete
23	Have a quantifiable metrics for measuring the real status of work, both cost and schedule of all professional service contracts, and any inter-local agreements for participatory services	Jun-11	Complete
24	Develop a Contingency Management Plan which will identify the specific risks and implement the anticipated mitigation measures	27-Sep-11	Complete
25	Develop an Environmental Mitigation Program that identifies required environmental mitigation actions and the party responsible for the mitigation and that will eventually become the basis for quarterly mitigation monitoring and quarterly mitigation reports	Jan-11	Complete
26	Update and implement the:		
	Real Estate Acquisition and Management Plan	Jan-11	Complete
	Bus Fleet Management Plan	Jun-11	Complete
	Safety and Security Management Plan	Jun-11	Complete
	Quality Management Plan	12-Jan-11	Complete